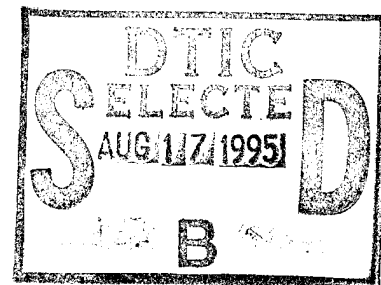


NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

**THE ROLE OF NON-LETHAL WEAPONS
IN
"SPECIAL WARS"**

by

Gregory R. Lynch

March, 1995

Thesis Advisor:

John Arquilla

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"SPECIAL WARS"**

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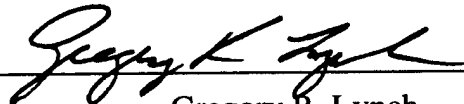
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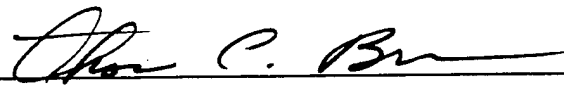
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ABSTRACT

This thesis addresses the role of non-lethal weapons (NLWs) within missions conducted by special operations and general purpose forces in peacetime contingency operations referred to as "special wars." It takes a paradigmatic approach from the emerging debate concerning the revolution in military affairs (RMA). The specific concepts employed constitute the paradigm of control warfare. We hypothesize that, the more tenets of control warfare are applied to a mission or operation, the more effective will be any application of non-lethal weapons, and the greater the likelihood of success.

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EXECUTIVE SUMMARY

This thesis asks how may we best address the role of non-lethal weapons (NLWs) within the missions conducted by special operations and general purpose forces in peacetime contingency operations (PCOs), or what might also be referred to as "special wars." It takes a paradigmatic approach to the problem by examining the theory and concepts associated with the emerging body of work that address the revolution in military affairs (RMA). The specific concepts employed in the analysis are drawn from the paradigm of control warfare. Analysis using this perspective may provide a more synergistic view of how we fight these special wars versus a traditional analysis using attrition or maneuver warfare paradigms.

The thesis reviews the definitional and doctrinal arguments concerning NLWs. After developing a typology for NLWs, it focuses on the class of PCOs at the high end of the spectrum of conflict short of war. This widening niche, that we also refer to as "special wars," constitutes neither conventional war nor stand alone military operations other than war (MOOTW), but the complex integration of both military force and political instruments to accomplish strategic goals through a campaign(s) by joint forces under the control of a joint forces commander (JFC) or theater CINC to meet specified national objectives.

The paradigm of control warfare, expanded upon under the theoretical RMA discussion, is used to develop a model for viewing the principles involved in these operations. Using the model, this thesis focuses on the comparative analysis of two different mini-case studies of follow-on operations within Operation JUST CAUSE in the war in Panama in 1989-1990. They are analyzed with respect to the control warfare paradigm to examine the validity of the hypothesis that the degree of mission success is governed by how well the tenets of the theory of control warfare are applied to a mission or operation. As a result, it is hypothesized that by following these tenets in future operations similar to these reviewed, the more effective would be any application of non-lethal weapons, either as an adjunct to lethal weapons or standing alone, depending on the specific goal of the overall operation.

A second analysis follows each mini-case study, using quality function deployment (QFD) techniques to examine the specific applicability of types of NLWs to operational tasks within these missions. The criteria used for this analysis are measures of effectiveness (MOEs) expanded along the dimensions addressed in the theoretical discussion. The external constraints on the use of specific NLWs - the legal and ethical, sociopolitical, informational, environmental, and economic constraints - are weighted and internalized into the decision problem by the use of QFD matrix analysis. The criteria used in this second perspective both provide confirmation of the first paradigmatic analysis, and as the baseline for further interdisciplinary quantitative research.

The findings of this study are that the concepts of information dominance and the other tenets associated with control warfare have a direct relationship to how well suited non-lethal weapons may be to application in these burgeoning "special wars" that we shall likely be facing in the future. It also follows that NLWs should not be considered piecemeal, without consideration of the other instruments of power and application of non-lethal tools, sensors, and precision guided standoff munitions that will also populate this information-based type of knowledge warfare. This work is a preliminary effort, and as such it also suggests the need for further research into the broader questions of how to view NLWs quantitatively. Other directions for inquiry include how NLWs should be viewed with respect to arms control discussions, countermeasures, and special use cases, such as in the support of emerging counterproliferation missions as driven by the Defense Counterproliferation Initiative.

I. INTRODUCTION

I will also direct the Office of the Secretary of Defense to accelerate efforts to field non-chemical, non-lethal alternatives to RCAs for use in situations where combatants and noncombatants are intermingled . . .

(President William J. Clinton, 23 June 1994)

A. BACKGROUND AND PURPOSE

As recently as a few years ago, just saying the words, *special operations* and "*non-lethal weapons*," in the same sentence would have drawn raised eyebrows from most military officers. Nevertheless, this thesis intends to explore the mission utility and role for "non-lethal weapons" in special operations missions conducted in "special wars." Briefly defined, non-lethal weapons may be referred to as those that disable personnel, weapons, supplies, or equipment in such a way that death or severe permanent disability to personnel are *unlikely*.¹ In one form or other they have been used throughout history, as we will review later in this section. In a recent draft DoD policy for non-lethal weapons the following definition was proposed:

Non-lethal weapons are discriminate weapons that are explicitly designed and employed so as to incapacitate personnel or material, while minimizing fatalities and undesired damage to property and the environment. Unlike weapons that permanently destroy targets through blast, fragmentation, or penetration, non-lethal weapons have relatively reversible effects on targets and/or are able to discriminate between targets and non-targets in the weapon's area of impact.²

This thesis addresses the question, how may we best assess the role of non-lethal weapons within the missions and sub-missions conducted by the United States Special Operations Command (USSOCOM) special operations forces (SOF) as they prosecute missions as part of the integrated force in complex peacetime contingency operations in the

¹ The definition as used by Major Joseph W. Cook III, Major David P. Fiely, and Captain Maura T. McGowan in, "Non-lethal Weapons and Special Operations: Technologies, Legalities, and Potential Policies," an unpublished study conducted for HQ USAF/XOXI, 27 Jun 94, p. 3.

² Draft DoD Directive, SUBJECT: "Policy for Non-Lethal Weapons" (Draft, 21 July 1994), currently out for comment. Draft signed out by Dr. Christopher Lamb, Director, Policy Planning in the Office of the Assistant Secretary of Defense, Special Operations/Low Intensity Conflict OASD(SO/LIC) (Policy Planning).

post-Cold War era.³ This thesis will concentrate on using a mission-based perspective to examine the requirements and constraints for non-lethal weapon (NLW)⁴ applications in SOF missions. As such, this mission-based analysis includes a careful examination of the way special operators fight. Many of these emerging missions may also be assigned to general purpose forces (GPF). In this respect, this analysis would apply more to the special nature of these missions than to the explicit designation of units.

SOF are required to operate in situations which demand an adaptive, proportional, and precise approach to the defeat of an adversary. In response to this requirement, U.S. SOF have worked jointly to develop training and tactics, planning and rehearsal, and operational techniques and support systems to prosecute their various missions. SOF have developed a variety of mobility and maneuver options on land, sea, and air to complement conventional means: from motorcycles and light vehicles to fast boats and submerged SEAL Delivery Vehicles (SDVs) to high altitude high opening (HAHO), high altitude low opening (HALO) and very low altitude static line parachute jumps, to light, medium, and heavy-lift helicopters, gunships and specialized transport aircraft. Similarly, SOF command, control, communications, computers, and intelligence (C4I) systems have undergone an extensive and intensive development effort to offer redundant and flexible options for the optimal use of these forces in conflict. Advances in more precise and deadly weapons have also been fielded in recent years for SOF and GPF fire support.

But, this quick review uncovers the limited availability of suitable options or choices between the use of deadly force and the use of no force for SOF. The lack of NLW options for defense or offense constrains the flexibility of these forces to respond appropriately in environments governed by restrictive rules of engagement (ROE) or limited policy

³ General Purpose Forces (GPF) are also facing these challenges. To the extent that they task, organize and operate under a the same paradigm as SOF, this research would apply to the prosecution of their missions. However, the purpose here is to focus primarily on SOF.

⁴ As will be seen in the review given in this thesis, not only is it hard to find agreement on the definition for non-lethal weapons, it is even harder to find agreement on using similar terminology. Even the spelling of the same terms strikes debate as some authors hyphenate non-lethal and others do not. We will use the same convention as currently pending DoD policy direction, by hyphenating the word or using the acronym NLW to refer to these weapons. When quoting other sources, we will honor their convention.

objectives. Increasingly, the U.S. finds itself engaged in Military Operations other than War (MOOTW) to support national policy objectives in the post-Cold War world. Proper consideration of the present and future need for non-lethal capabilities for SOF prompts a review of the framework for missions conducted in the most complex combinations of MOOTW and limited conventional warfighting scenarios.

Using this perspective, this thesis introduces a better way of understanding the proper integration of possible NLWs into SOF missions by first reflecting on the doctrinal paradigm under which these forces would operate. These future operations do not seem best described by using the existing paradigms for warfare of attrition and maneuver.⁵ A better description may be as suggested by the emerging paradigm of "control warfare" which links information dominance to the concept of the enemy as a system⁶ to understand how to defeat even a strong opponent with minimum cost and loss of life.

The next step is to test this emerging paradigm by examining demanding cases. For this thesis, this requirement will be satisfied by examining SOF missions performed in peacetime contingency operations (PCOs)⁷ that may be sustained, complex, and extensive. These PCOs deal with very limited conventional regional threats, unconventional regional threats, and trans-regional threats that define the environment short of war for which OASD(SO/LIC) is developing a policy framework. They fit into the gray area or "special war" category located at the high end in the continuum between MOOTW and conventional war. Defined as "special wars" in this thesis because they are not conventional war,

⁵ Army Field Manual 100-5 (June 1993), Air Force Manual 1-1 (March 1992), Naval Doctrine Publication (NDP) 1, Mar 1994.

⁶ The concepts of information dominance and the enemy as a system spoken of here are based on the thought paper by John Arquilla and David Ronfeldt, "Cyberwar is Coming!," *Comparative Strategy*, 12, 1993, 141-165 and Arquilla, "The Strategic Implications of Information Dominance," *Strategic Review*, Summer 1994, 25-30. Additional reference for the modeling of the enemy as a system goes to Col John A. Warden III, "The Enemy as a System," *Concepts in Airpower for the Campaign Planner*, Air Command and Staff College, 1993.

⁷ Peacetime Contingency Operations are defined in Army Field Manual 100-20/Air Force Pamphlet 3-20, *Military Operations in Low Intensity Conflict* (Dec 1990), as Politically sensitive military operations normally characterized by the short-term, rapid projection or employment of forces in conditions short of war. The usage here emphasizes the high end of the continuum short of war.

MOOTW, or discrete special operations, but, rather a unified campaign or series of campaigns waged in an integrated fashion by a unified commander or joint forces commander (JFC).⁸ The "special war" that is used as the basis for this study is the first one waged under the new command relationships developed as a result of the Goldwater-Nichols Act of 1986 - the conflict in Panama in 1989-1990. It was comprised of two major sequential integrated operations that phased from one into the other: Operation JUST CAUSE, as the force projection and crisis response phase, and Operation PROMOTE LIBERTY, the post-crisis civil initiatives phase. The hypothesis to be tested is applied to special operations forces operating in environments that create tension between the military desire to come in with guns blazing in a maximum use of force and the political necessity to employ the minimum amount of force. The hypothesis is that the more the concept of control warfare was applied to our conduct within these mission areas, the more effective would have been the use of NLWs in leading to mission success. This would be true whether they were to be used as an adjunct to lethal weapons or used independently, depending on military necessity or the specific objective desired.

This thesis recognizes the potential constraints on the use of NLWs, as well as their advantages. Because of the newness of the technology surrounding some of these weapons, a subjective weighting of their net potential based on these constraints will be factored in the projected quantitative assessment. Even though emerging mission areas that SOF are currently facing are already creating a demand for NLWs, finding a "magic" bullet that works effectively while avoiding lethal doses may prove difficult. As the Commander in Chief (CINC) of USSOCOM has noted:

We can design a projectile that will not hurt a grown man but that will kill a child, or someone who is old, infirm or sick. I am very interested but I have not found the Holy Grail yet.⁹

⁸ For a thought provoking discussion of integrated operations, see CPT(P) Michael M. Kershaw, *The Integration of Special Operations and General Purpose Forces* (Monterey, CA: Master's Thesis, Naval Postgraduate School, Dec 1994).

⁹ R. Pengelley, interview with General Wayne A. Downing, *Defense News*, 11-17 April 1994, p. 30.

This thesis does not propose NLWs as a panacea. However, the detailed argument developed, based on the actual mission case studies, should shed light on the larger value of an integrated approach to the use of innovative and adaptive means to accomplish the end goals of an operation. New ways of operating or organizing to do battle, using the tenets developed when applying the paradigm of control warfare, should illustrate the synergistic effects on all elements as they come together in battle.

1. Brief Historical Overview

Throughout history, humans have increased their ability to destroy in warfare, at times by small increments at other times aided by quantum leaps in technological development or paradigm shifts. Since the adoption of the use of the pike and the Greek development of the catapult in Sicily¹⁰ between 400-300 B.C., the evolution of lethal weapons has progressed in leaps and bounds. As Dupuy describes the progression, arms have evolved from the swords and bows of the Age of Muscle to the cannons and muskets of the Age of Gunpowder beginning in the early 1500s. Along with industrialization came rifled magazine loading long arms and belt-fed machine guns, and tanks, rockets, fighters, bombers, battleships, aircraft carriers, submarines, and nuclear weapons. In the post-industrial era, precision guided munitions (PGMs) and "intelligent machines" have sprouted up.¹¹ Industrialization led to an attritional paradigm and large conscript armies. Modern rifles, machine guns, and artillery combined to produce the wholesale carnage of World War I. The paradigm of maneuver was spurred on by the development of the internal combustion engine and mechanization. German *blitzkrieg* doctrine in World War II provides the defining example.¹² The developments in gas turbine propulsion technologies have vastly increased the range and dominance of air warfare in maneuver over the battlefield and supported the concepts of air superiority and aerospace control to allow flexible force application.

¹⁰ Martin van Creveld, *The Transformation of War* (New York: Macmillan, 1991), p. 83.

¹¹ Trevor N. Dupuy, *The Evolution of Weapons and Warfare* (Indianapolis: Bobbs, 1980), pp. 286-289.

¹² John Arquilla, "The Strategic Implications of Information Dominance," *Strategic Review*, Summer 1994, p. 26.

Looking to the future, the fusion of revolutionary work in sensors, computers, and "hyper-technology weapons" will lead to even greater and more precise lethality for troops, armored vehicles, vessels and aircraft. The Army tested some of these nascent technologies at the National Training Center (NTC), Ft. Irwin, California, during their "Digital Soldier" advanced war-fighting experiment April 10-23, 1994. However, the results of digitization were mixed against experienced "Red Force" opposing forces (OPFOR). The results suggested that the hypothesis that digitization will enhance the power of the force is valid but that no amount of high technology will ever take the place of basic soldiering skills, leadership, imagination, and organization. Exercises like this are just the beginning for exploring these new technologies.¹³ A National Research Council report, *Star 21, Strategic Technologies for the Army of the 21st Century*, predicts advances that will serve to make the battlefield "unprecedentedly dangerous." It also alludes to the same technologies being useful in improving the odds of survival through the use of stealth, low-probability-of-intercept sensors, and electronic countermeasures.¹⁴

In contrast, the development of NLWs has been less structured, and until recently, less emphasized than lethal weapons. Notable historical examples of the use of NLWs include obscuring smoke in the Peloponnesian Wars to mask troop actions.¹⁵ Other examples of the use of sounds include the screams of attacking Celts, the bagpipes of Scottish Highlanders, the drumming of spears against shields by Zulu warriors, and the Rebel yell. These examples from previous centuries illustrate the use of sound in a nonlethal application to strike fear into the hearts of an enemy and affect the outcome of battle. During the U.S. Civil War, following the Battle of Chattanooga, there was an unusual engagement on the night of 28-29 October 1863 near Chattanooga, between the forces of the Confederate General Longstreet and those of the Federal General Hooker. "The Federals were assisted by

¹³ David Silverberg, "The Battle of Debnam Pass," *Armed Forces Journal International*, June 1994, pp. 32-33, sidebar.

¹⁴ NRC report, *Star 21*, as reported by William Matthews, *Air Force Times*, November 21, 1994.

¹⁵ Referenced by David C. Morrison, "War Without Death?," *National Journal*, 7 November 1992: 2589.

their mules, which took fright and stampeded towards the enemy, who broke and fled, imagining a cavalry charge was upon them."¹⁶ It is interesting to note that this effective although accidental use of "non-lethal mules" was never subsequently adopted.

As a goal, Sun Tzu wrote as his third tenet of offensive strategy: "To subdue the enemy without fighting is the acme of skill."¹⁷ However in reference to this pursuit, the use of nonlethal weaponry has been relegated to secondary military roles: mostly limited to deterring the enemy, weakening combat effectiveness, using deception to induce capitulation to a lesser force without engaging in combat, improving security and self protection, or enabling the more efficient use of lethal weapons. In this manner the tools of the trade in the fields of intelligence, psychological operations and electronic warfare have matured. For the most part, nonlethal weapons directed specifically at individual personnel were primarily used by states in quelling civil disorder. Examples that come to mind include rubber bullets, water cannons, tear gas, and long batons used against rioters. Indeed, in this century, non-lethal weapons used in place of lethal weapons have been more a creature of internal policy than a warfighting tool.

As we will elaborate in Chapter II, this situation is undergoing rapid change as a result of the shifting post-Cold War environment and a governmental policy of minimum use of force and limited collateral damage. Additional factors drawing interest to NLWs include: a downsized military, accelerating technological development, a societal paradigm shift to an information age, and the related discussion of an emerging Revolution in Military Affairs (RMA). This new environment, governmental policies, and the other relevant factors have combined to generate high-level policymaker, academic, and military interest in a broad spectrum of NLWs.

¹⁶ The above examples are drawn in part from an extensive listing in an Air Command and Staff College study conducted by Major Terry L. Carpenter, Major Biltim Chingono, Major Jeffry A. Dull, Major Michael S. Kalna, Major Jim H. Keffer, Major Jonathan W. Klaaren and Major Ronald S. Mitchell, *Nonlethal Technology and Airpower: A Winning Combination for Strategic Paralysis* (ACSC: June 1994). The Civil War example was cited from a quote in J. F. C. Fuller, *A Military History of the Western World* (New York: Da Capo Press, Inc., n.d.).

¹⁷ Samuel B. Griffith, ed. and trans., *Sun Tzu: The Art of Warfare* (London: Oxford University Press, 1963), p. 77.

2. Relevance

Technological developments in the last few decades have produced a plethora of emerging and maturing options for nonlethal warfare. One rising debate among technologists, policymakers, military officers and academics has centered on the need to develop a new paradigm for nonlethal warfare to frame future policy toward development, acquisition, and integration of these weapons into our arsenal. Some of the paradigm proposals offered take a "top-down" technological or moralistic approach to the question.¹⁸ A conversation with a Department of Defense official¹⁹ who would sit on the recently proposed Non-Lethal Weapons Steering Committee, confirms that DoD is grappling with the basic definition of nonlethal weapons and plans to issue an annual Non-Lethal Weapons Master Plan. Regardless of the challenges, there is a strong push to develop nonlethal weapons. Deputy Secretary of Defense, Dr. John Deutch notes:

The trend is toward more accurate weapons, that limits the task with small error - nonlethal weapons are a natural evolution. . . It is very important to shut down a country with minimum force.²⁰

In the post-Cold War world the U.S. is facing further dangers to its national security caused by the increased disorder and turbulence in regional relations and the diffusion of technology in the international arena. The dangers include the proliferation of weapons of mass destruction, regional wars of resurgent nationalism or religious revivalism, state sponsored terrorism, and other threats to international peace (or to emerging democracies). To react properly to these threats, as well as to other MOOTW, will increasingly require the selective use of U.S. special operations forces either alone or in concert with general purpose forces(GPF). In integrated operations, the reformed U.S. Atlantic Command's (USACOM)

¹⁸ See Janet Morris, "Nonlethality: A US Global Strategy Council Concept Paper" (Washington, D.C.: United States Global Strategy Council, 1990) or "Nonlethality: Development of a National Policy and Employing Nonlethal Means in a New Strategic Era" (Washington, D.C.: US GSC, 1991).

¹⁹ Discussion with Mr. Don N. Henry, Staff Specialist - Tactical Systems in OSD(AQ), at National Institute of Justice (NIJ) symposium, "21st Century Law Enforcement," 21 May 94.

²⁰ Remarks made by Dr. Deutch, while he was then Under Secretary of Defense (Acquisition) in a speech to the Council on Foreign Relations on 5 November 1993.

Adaptive Joint Force Packages (AJFP) suggest one possible composition or force mix.²¹ In these operations, however, these forces will be bounded and constrained at the strategic, operational, and tactical level by political sensibilities and limited policy objectives, domestic and military concerns for loss of life, media coverage, and situations with mixed combatants and civilians. All these constraints point toward the need for limiting the loss of life on all sides. The aforementioned high-level interest in policy circles in the subject of nonlethal weapons suggests the relevance of studies that work to determine the role of nonlethal weapons in special operations.

B. SCOPE

This thesis is primarily focused on the mission-specific line of inquiry for NLWs. Since any substantial reliance on such weapons will necessitate a serious reassessment of doctrine as well as rethinking overall military planning and strategy at the tactical, operational, and strategic levels, we do not anticipate the need to concentrate on a lengthy or detailed discussion of all the possible weapons technology options. Many excellent open source studies have developed reasonably comprehensive listings of the different possible technologies.²² We will compile the technologies and present a baseline listing in Appendix A. We will concentrate mainly on ordering these technologies and concepts by cross-listing them in a functional typology that categorizes their value based on targets and tasks. These categories can be scaled to apply at the tactical, operational, or strategic levels of conflict. Using measures of effectiveness (MOEs) developed from a review of the emerging paradigm of control warfare, case studies will be examined to see where previous missions might have benefited by the use of NLWs from these categories.

²¹ ADM Paul David Miller, "A New Mission for Atlantic Command," *Joint Forces Quarterly*, Summer 1993, 80. *Adaptive Joint Force Packaging (AJFP): A Critical Analysis* (Monterey, CA: Master's Thesis, Naval Postgraduate School, Dec 1993), pp. 64-75.

²² The list of studies detailing specific technologies includes the already cited works by Cook, 1994; and Mitchell, 1994 (Appendix). Other excellent sources include: an article by Paul R. Evancoe, "Non-Lethal Technologies Enhance Warrior's Punch," *National Defense*, December 1993, pp. 26-29; a briefing by John Alexander of the Special Technologies Group, Los Alamos National Laboratory (LANL) to USSOCOM, "Nonlethal Weapons Concepts," 31 March 1994; and a publicly released DoD briefing, "DoD Activities in Non Lethal Weapons" (94-S-4521), cleared October 19, 1994.

One of the problems with researching these weapons has been the differing security classifications of the same or similar systems by different services or agencies. In respect to this conundrum, we will be circumspect when discussing anything that could possibly be considered sensitive or classified. This philosophy also will be used when addressing special operations roles and missions in Panama. We intend to rely on open source references and unclassified interviews. One last problem involves the plethora of news reports, magazine and journal articles, studies, and draft policies being currently generated on this subject. For this reason the information cut-off date for this thesis is 21 November 1994. The risk, of course, is that some of the data provided herein may be overtaken by events. However, the theoretical application should remain valid.

C. ORGANIZATION

This thesis begins with an overview of the detailed definitions of PCOs and non-lethal weapons necessary to understand the later discussion of their detailed elements. PCOs comprise different and sometimes overlapping missions for special operations forces, conventional forces, Department of State (DOS) and other government agencies (OGAs). Integration of the military assets and interagency cooperation with OGAs, non-government organizations (NGOs) and other foreign governments or host nations (HN) may combine to develop a complex, coalition command and control relationship for PCO "special wars." The nature of the different missions and environments faced in the distinct phases of these PCOs produces different perspectives for evaluating the functional categories in the typology of NLWs that we will discuss in the second half of this chapter. As mentioned earlier, a listing of the types and technologies of NLWs, either now becoming available or proposed, will be available in Appendix A. A review of recent non-lethal initiatives, an expanded definition and categorization of NLWs, and the brief mention of a concept for differentiating non-lethal tools from others will all fall under the title of a discussion of non-lethality in the second section of the chapter. The advantages and constraints to non-lethal warfare and the subject of countermeasures and arms control for specific weapons will be introduced.

Chapter III reviews the attrition, maneuver, and control warfare paradigms, and develop an operational model for the emerging paradigm of control warfare. This operational model will be used in a systems approach to discover guidelines for viewing the "traditional" principles and tenets of warfare using the lens provided by the theory of control warfare. With knowledge of the enemy as the driving force in this discussion, a perceptual shorthand for viewing the enemy at the tactical, operational, and strategic levels will be offered.

In Chapter IV, this model or theorized perspective will then be applied to the general arrangement and disposition of SOF forces in Panama for the initial main battles of the "special war," Operation JUST CAUSE. This general discussion is then narrowed and focused later in the chapter, when detailed reviews are given of two mini-case studies from follow-on missions in Operation JUST CAUSE: 1) the western campaign in Chiriquí province and the surrender of the Military Zone 5 commander, Lt. Col. Luis del Cid in David, and 2) the urban control efforts in Panama City (and Colón) immediately after the initial *coup de main*. This thesis describes the way different missions within this operation were planned, managed and fought at the tactical, operational, or strategic levels. The relative success or failure to accomplish the stated goals of these missions is compared to how well the tenets of control warfare theory can be applied. These case studies provide a demanding test for the tenets of the theory of control warfare, because these operations encapsulate in fine detail some of the innovative and adaptive ways special operations forces are now commanded and fought and the constraints on missions within these large peacetime contingency operations.

Chapter V analyzes the different missions, when the task was to paralyze or otherwise disable versus kill the adversary or target. The analysis is represented by matrices that are developed that compare the desired goal of the mission and the proposed Measures of Effectiveness (MOEs) that the mission's goals would suggest, plotted versus a projection of the probable level of effectiveness of the different categories of nonlethal weapons. This is accomplished for all the different categories of weapons in the typology of nonlethal weapons that this thesis proposed and developed in Chapter II (unless otherwise noted). The

different technologies that cross-reference within the categories listed are then examined. Scenarios are developed from within the case studies and from other anecdotal examples to show how nonlethal weapons may aid special operations forces in future engagements and the MOEs developed in the thesis will be suggested to judge their use.

The conclusion, Chapter VI, reviews and summarizes the analysis of Chapter V and offers recommendations. Also examined is the necessity for developing countermeasures and for examining arms control implications for the possible proliferation of the more destabilizing and destructive variants of possible NLW systems. This open ended work concludes by ordering the proposed MOEs for use in an interdisciplinary development of an object-oriented software program to provide prioritized guidance for judging the employment of NLWs. This procedure could assist the following research and development efforts and policy development: 1) Input for seminal work being done by the Advanced Research Projects Agency (ARPA), 2) Measures to consider for simulations and "Digital Soldier" like field tests during the early injection of technical expertise in the limited procurement phase by using Advanced Concept Technology Development (ACTD) programs (as DoD Science and Technology (S&T) advises in the process), 3) "Bubble up" policy influence for OSD, the Non-Lethal Weapons Steering Committee, OASD(SO/LIC), the Services, and USSOCOM from a review of the analysis of these case studies, or 4) Operational testing of NLWs and possible concurrent or later use in decision aids for the operational commander.

II. DEFINITIONS

A. "SPECIAL WARS"

After carefully reviewing recent doctrinal guidance and the military and academic literature that suggests a transformation in the way we view war and Military Operations other than War (MOOTW),²³ we now offer a more precise definition of "special wars," as used in the following discussions. "Special wars" could be described as either lesser regional conflicts (LRCs)²⁴ or what we have referred to in Chapter I as peacetime contingency operations (PCOs). For example, PCOs like Operation JUST CAUSE/PROMOTE LIBERTY and (the narrowly averted forced-entry option of) Operation RESTORE DEMOCRACY in Haiti, cannot be considered conventional war (CW) scenarios, and yet do surpass the levels of classification for any one discrete category within the MOOTW environment. The range of forces and missions also surpasses any one description for SOF in Joint Pub 3-05, *Doctrine for Joint Special Operations*. These operations may include forced entry and combat operations as part of Joint Task Force (JTF) organizations that conduct operations and task organize below the corps level.

These PCOs may encompass the integration of elements of GPF, SOF, DOS, OGA (USAID, USIS, DEA et al), NGOs, HN, and local private volunteer organizations (PVOs). The challenges these PCOs present are dynamic. By conducting a coordinated medium-term sustained campaign that consists of time-phased and simultaneous operations that span the missions described for multiple types of MOOTW, or even a short CW, they populate the widening fuzzy grey line that defines the difference between CW and MOOTW scenarios

²³ Joint Pub 1, *Joint Warfare of the US Armed Forces*, 11 November 1991; Joint Pub 3-05, 28 October 1992, Joint Pub 3-07(Draft), 18 July 1994; Army Field Manual 100-20/Air Force Pamphlet 3-20, 5 December 1990, Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston: Little, Brown and Co., 1993); van Creveld, 1991, *The Transformation of War*; Strategic Studies Institute (SSI) RMA monographs (6), 6, 10 June and 15, 20, 22, 25 July 1994; Arquilla and Ronfeldt, 1993; and Arquilla, 1994.

²⁴ The generic term used in the 1 September 1993, Bottom-Up Review (BUR) brief by Secretary of Defense, Les Aspin.

(see Fig 2.1).²⁵ Existing either as what one may consider the lowest rung of CW or the high end of the continuum for MOOTW, they represent what an OASD(SO/LIC) policy paper considers as situations for the employment of measures short of war (MSW). These measures should be considered for selective engagement against unconventional regional threats or trans-regional threats.²⁶ These PCOs should also be considered as alternative preventive responses to counter developing lesser conventional regional threats - to "nip them in the bud" before a later large-scale conventional Major Regional Conflict (MRC) response might become necessary. This selected engagement scheme seems in agreement with our new *National Security Strategy of Engagement and Enlargement*.²⁷

The dilemma is that even with an increased probability for more conflict situations like these PCOs in the post-Cold War environment and the development of Joint Publications to address the issue,²⁸ there exists a doctrinal gap for describing them as integrated operations.²⁹ This suggests the need for their further study. Martin van Creveld points out that a lesser view of non-trinitarian war or low-intensity conflict (LIC) in the recent past, has prevented a proper strategic appreciation for LIC. He has argued that it has not been taken seriously until too late.³⁰ Coupled with this, is the fact that they encompass a microcosm of most all the elements of MOOTW and the political, legal, social, cultural,

²⁵ Figure 1.1 adapted from Figure I-1, Joint Pub 3-07(D), 18 July 94, p. I-7.

²⁶ OASD(SO/LIC) (4 Mar 1992, Working Paper Draft) Concept Paper on the environment short of war, pp. 4-9, 18-21.

²⁷ *National Security Strategy of Engagement and Enlargement*, 21 July 1994.

²⁸ Joint Pub 3-07, *Joint Doctrine for Military Operations Other Than War* (18 July 1994 DRAFT) describes environments, and Joint Pub 3-05, *Doctrine for Joint Special Operations* (28 October 1992), describes the planning and organization of special operations forces and their missions. The definitional break between conventional war and special operations seems conducive to the neglect for the most complicated scenarios.

²⁹ Please refer to Michael M. Kershaw, *The Integration of Special Operations and General Purpose Forces*.

³⁰ Martin van Creveld, *The Transformation of War* (New York: Macmillan, 1991), p. 57.

Range of Military Operations			
Military Operations		General U.S. Goal	Representative Examples
COMBAT	War	Fight & Win	Large Scale Combat Operations Attack Defend Blockade
	M O O T W	Deter War & Resolve Conflict	Peace Enforcement Support to Counterinsurgency Show of Force Raid Strike Counterterrorism Counter-proliferation Noncombatant Evacuation Ops Humanitarian Assistance
		Promote Peace	Antiterrorism Counterdrug Peacekeeping NEO Civil Support Disaster Relief Nation Assistance
		NONCOMBAT	
PCO - "SPECIAL WARS" (i.e. Operation JUST CAUSE/PROMOTE LIBERTY)			

Figure 2.1 - Modified Range, After Joint Pub 3-07(D)

and informational entanglements that to differing degrees constrain the conduct of the different phases within the overall operation. This suggests their value and use as a source for fine-grained demanding cases for evaluating the emerging paradigm of control warfare, and also as crucibles for evaluation of the possible employment of NLWs in the PCO at the

tactical, operational, and strategic level. The principles of MOOTW that are presented in Joint Pub 3-07: Objective, Unity of Effort, Security, Restraint, Perseverance, and Legitimacy,³¹ and the unified principles of war that control warfare theory suggests (reviewed in Chapter III), combine with the "normal " principles of war to illustrate the complex command challenges these operations may engender, beyond the relatively straightforward constraints on the employment of forces in a conventional war or MRC.

Now that we have established where these "special wars" fit in the spectrum of conflict, we will next discuss some of the roles for the different SOF and GPF elements that may participate in them. These PCOs generally have three major phases. The first is the forced entry, usually accomplished either through an air head, port facilities, airborne or amphibious landing. The next phase is the sustainment phase, characterized by the stabilizing of the operation by military augmentation with follow-on forces and the various political and military operations designed to over-match and defeat the adversary. The final phase is the continued stability operations, like foreign internal defense (FID) and nation assistance to aid the transition of the host nation to a stable or normal independent state of affairs.

In the forced entry phase, SOF may be required to perform Direct Action (DA), Unconventional Warfare (UW), Special Reconnaissance (SR), and Counterterrorism (CT) missions. Even before the large-scale raid or strike that "kicks the door open," SOF may be involved at a lower level in the above missions, with the inclusion of psychological operations (PSYOPS), human intelligence (HUMINT), and counterinsurgency (CI) missions supporting the entry into battle. SOF and GPF may also conduct coalition warfare missions to facilitate interoperability between U.S. and allied forces. GPF forces may conduct air strikes, naval bombardment, or cruise missile attacks in this opening phase.

In the sustainment phase, GPF may replace-in-force or quickly augment the SOF elements that opened the operation. The force mix of the JTF may be as described by the

³¹ Joint Pub 3-07, pp. II-1 - II-10.

USACOM definition for AJFPs: "a capabilities centered grouping of forces and headquarters organized and trained to meet specific peacetime, crisis or wartime requirements of the supported combatant commander."³² The various SOF and GPF missions must be coordinated to further the intent of the combatant commander. In these PCO scenarios, the use of adaptive SOF packages or task forces must be able to quickly meet the objectives of missions requiring minimum collateral damage and economy of force. As will be seen in the case studies, when the command philosophy incorporates flexibility and provides for decentralized execution, these operations can have outstanding results.

In the final phase, the continued stability operations become essential as we transition from a warlike situation of "us versus them" to a more policeman like situation of "us helping them." The ROE and modus operandi of the Special Forces (SF) teams and Civil Affairs (CA) groups that stay behind when the bulk of the troops leave has to adapt to a positive presence influence. These critical missions, like the civil-military operations run by OGAs and the efforts of NGO, other foreign governments (OFG) or UN peacekeeping forces must all be coordinated to ensure the long term success of a PCO.

Hopefully, this review of what a PCO generically encompasses will be helpful during the later discussions of non-lethal warfare, the control warfare paradigm, and the specific case studies. When speculating on future possible scenarios, this "special war" model will be useful to examine the roles, missions and functions of a representative force and the countermeasures and constraints the enemy and the environment presents for each phase. This discussion has been cursory at best and we suggest that an early marker be put down now for further research on "special wars."

³² ADM Paul David Miller, USN, "US Atlantic Command: Focusing on the Future," *Military Review*, September 1994, p. 7.

B. NON-LETHALITY

This section will expand on the earlier definition of NLWs given in the introduction to the thesis. One other term will also be defined, non-lethal tools, in order to clarify the distinction between a NLW and combat support tools. It is hoped that this approach will serve as the basis for a presentation of a functional typology that we will also develop. This contains target or task based functional categories into which all the technologies and types of NLWs concepts listed in Appendix A may be cross-referenced.

Also introduced in this chapter is the lively debate on the perceived constraints on the use of NLWs. The resulting weight of these arguments will be used in Chapter V to examine the legal, political, social, and informational aspects of these constraints. In Chapter V, anecdotal examples will be drawn from within Operations JUST CAUSE and PROMOTE LIBERTY, as well as from a selected review of non-lethal use of force in peacetime internal responses to political violence by the U.S. and by other governments. Also some military responses within conflict or war will be used to round out the discussion. Later, during the analysis in Chapter V, these constraints will be quantified and used to weigh the utility of NLWs that seem the most promising when viewed in the context of missions conducted under a control warfare paradigm. From this an overall assessment will be summarized and presented in the conclusion.

1. Recent Non-Lethal Initiatives

As discussed in Chapter I, NLWs have been used throughout history. In fact, the first prehistoric altercation between two of our ancestors that was decided with a debilitating, but recoverable blow from a club or fist instead of a death blow to a combatant probably serves as the lead example. However, recent interest in this subject in the last few years has increased dramatically. For some current background we will review general developments in the U.S. Then we will give a brief synopsis of DoD specific initiatives.

A paper published almost twenty-five years ago by Joseph F. Coates of the Institute for Defense Analyses (IDA), *Nonlethal Combat in Cities Overseas*, provides a preview of the unconventional warfare and MOOTW type missions and operations that are fueling

current debate on NLWs and the importance of limiting collateral damage. His ground breaking study also examined a majority of the high-tech and even some of the neglected low-tech potential concepts or mechanisms for non-lethal use in firepower missions.³³ The U.S. Army study of incapacitating agents has been ongoing since the 1920s and was particularly concentrated during the 1950s and 1960s.³⁴

The military combatant readers of this thesis are probably familiar with the following personal example - an Army training film shown during annual nuclear, biological, and chemical (NBC) refresher training that reviewed the effects of a debilitating agent on a volunteer soldier. The subject first runs through an obstacle course successfully and delivers a message. He is then exposed to the agent (probably the now discontinued agent BZ), he then half-heartedly attempts to complete the course before he is distracted and wanders off. Upon questioning, he seems very confused and seems to have no recollection of any message that he was to deliver. This example illustrates the effectiveness of some of these early weapons. The film definitely served to convince troops to become proficient in quickly donning their protective mask. What it does not reveal is the utility, suitability, or long term effects of such agents.

In the late 1980s, scientists at the nuclear labs and at DARPA began to concentrate on developing concepts for weapons that came to be called "non-lethal." Although various DoD agencies and the services have studied and researched non-lethal concepts and technologies, there has been no serious DoD policy review until February 1991.³⁵ Beginning

³³ Joseph F. Coates, "Nonlethal and Nondestructive Combat in Cities Overseas" (Arlington VA: Institute for Defense Analysis (IDA), Science and Technology Division, Paper P-569, May 1970), pp. 1-2, 9, 27. The methodology Coates uses in his analysis to quantify missions, non-lethal applications, effects, possible options, and constraints were unusually comprehensive -he examined 19 different non-lethal concepts.

³⁴ As cited in letter from Ken Collins, U.S. Army Edgewood Research, Development and Engineering Center, "Response to 'Nonlethal Military Force' Draft Paper," 2 May 1994, p. 2. to authors Col John L. Barry, USAF; LTC Michael W. Everett, USA; and Lt Col Allen G. Peck, USAF, in "Nonlethal Military Means: New Leverage for a New Era" (Cambridge, MA: Harvard, National Security Program Discussion Paper Series, Draft - 13 May 1994), p. 16.

³⁵ Barry, et al, 1994, describes and references some of the initiatives, pp. 16-19.

in 1990, letters from Ray Cline, chairman of the Global Strategy Council (and formerly DDI at CIA) to the President, the Secretary of Defense, and the Under Secretary for Policy urged that DoD aggressively pursue NLWs. Mr. Cheney, the Secretary of Defense, became interested in the subject and in the Spring of 1990 commissioned a Nonlethal Strategy Group to formulate an approach to the issue. OASD(SO/LIC) participated in this group.³⁶ In 1991, the group released their report. Their major findings about NLWs were that they could be the following: operationally attractive, legally and morally defensible, force multipliers when used with traditional means (consistent with military principles of economy of force and mass), technically feasible, and affordable. During this same time frame a substantial amount of publicity was generated by proponents at the U.S. Global Strategy Council and at the national labs.³⁷ Also in 1991, Congress sent a list of questions to DoD asking about the Pentagon's intentions regarding NLWs, and OSD sent non-committal responses back.

A proposal was developed by OSD officials to create a high profile Non-Lethal Technology Initiative, and to have JCS prepare an acquisition strategy, including promulgation documents, policy statements, and a public initiative. The proposal was turned down by the USD(P), Paul Wolfowitz, in September 1991 and apparently never reached the Secretary of Defense, Mr. Cheney. The reason officially given was that the existing approach was adequate.³⁸ Because of disagreements concerning technology issues, the autonomy and prominence that should be afforded the initiative, as well as political infighting, the group

³⁶ Charles F. Swett, Assistant for Strategic Assessment, OASD(SO/LIC), Policy Planning, Official Paper, "Strategic Assessment: Non-Lethal Weapons" (unpublished, n.d.) given to the author during interview, 27 Oct 1994.

³⁷ Janet Morris, 1990 and 1991, Chris Morris, "Nonlethality: Development of a National Policy and Employing Nonlethal Means is a New Strategic Era" (U.S. GSC, Washington, D.C., 1991). John Alexander, Special Technologies Group, Los Alamos National Laboratory, is a major proponent of an anti-material approach, which he terms, Non-Lethal Defense (personal interview, 18 May 1994).

³⁸ Ibid. p. 2. Also, apparently USD(AQ), Donald Yockey nonconcurred with the group's recommendations. His office disputed the need for a separate acquisition strategy and he felt that the acquisition community (including DARPA) was adequately exploring the potential value of non-lethal technologies. "New concepts must continue to compete on their own merits," wrote Yockey, "Non-lethal Warfare Study (Disabling Systems)," Memorandum for the USD(P), 20 September 1991.

was disbanded. With the departure of those appointed during the Bush Administration, however, there was a renewed effort to launch a "Nonlethality Strategy Initiative" overseeing development, policy, strategy and doctrine related to NLWs.³⁹ But since then, no office in Policy has picked up the lead, although the recent draft non-lethal policy directive out for comment from Dr. Christopher Lamb, the Director, Policy Planning, proposes that OASD(SO/LIC) co-chair a renewed effort with OUD(A&T).⁴⁰ According to Frank Kendall, director of tactical warfare programs, in an address to the Comdef '94 conference on 24 May 1994, the Pentagon plans to fund a modest initiative in the FY 1996 budget request. He also said that DoD hopes to develop a comprehensive policy by the end of the year that will address the legal, ethical, political, environmental, and other issues associated with the use of various nonlethal weapons.⁴¹ The modest funding request for some non-lethal initiatives was confirmed in an interview with John K. Reingruber, OASD(SO/LIC), on 28 October 1994.

In 1993-94, there were at least six major conferences.⁴² The last one was an unprecedented joint DoD and Department of Justice (DOJ) conference, co-sponsored by the American Defense Preparedness Association (ADPA) and the National Institute of Justice (NIJ) entitled, "Law Enforcement Technology For the 21st Century," was held 20-22 June 1994 in Washington, D.C. This was the first major conference to discuss non-lethal and

³⁹ Ibid p. 3., and Weinschenk, A., "Boosters again are pushing for 'Office of Non-Lethality,'" *Defense Week*, 16, Feb 1993, p. 2.

⁴⁰ "Policy for Non-Lethal Weapons" (21 July 1994, Draft), pp. 3-4.

⁴¹ Glenn W. Goodman, Jr., "Upping the Nonlethal Ante," *Armed Forces Journal International*, July 1994, p. 13.

⁴² Barry, 1994, pp. 16-17, and (note 24) gives a good review and summarizes the six conferences listed here: June 1993 - Massachusetts Institute of Technology, Cambridge, MA, sponsor, MIT Defense and Arms Control Studies Program; August 1993 - FBI Academy, Quantico, VA, co-sponsored by the Joint Service Small Arms Program (JSSAP) and the Army's Armament, Research, Development and Engineering Center (ARDEC); October 1993 - Center for Strategic and International Studies (CSIS), Washington, D.C., sponsored by same; November 1993 at Johns Hopkins University Applied Physics Laboratory, Laurel, MD, sponsored by LANL and ADPA; April 1994, The Eighty-Fifth American Assembly contained a panel on NLWs technology and a background paper by Richard L. Garwin of IBM; and the joint DoD and DOJ conference mentioned above.

other technology transfer issues from DoD and ARPA to Justice. It was a direct result of a MOU signed by Mr. Deutch and Ms. Reno in April. Other research activities by think tanks and the services added to the increased attention to NLWs.⁴³ For example, RAND is under contract by the Army and Air Force to study applications. Additionally, Booz-Allen & Hamilton hosted a non-lethal wargame for the Advanced Concepts and Plans Directorate of the ARL on 17-19 November 1993.

The Services have taken different specific tacks as to the development of NLWs. The Army appears to be the Service with the strongest interest in NLWs. ARDEC at Picatinny has taken the lead for the Army in the study and development of Low Collateral Damage Munitions. The U.S. Army Training and Doctrine Command (TRADOC) mentions non-lethal weapons or disabling operations concepts in two pamphlets.⁴⁴ According to Mr. Charles Swett's strategic assessment, at the policy level, the Air Force staffed the non-lethal issue in the Fall of 1992, and has adopted the position that it will start a program for non-lethal weapons if it is directed to do so by OSD, but will not take the initiative on its own. Also at the policy level, the Navy appears to have ignored the question entirely.⁴⁵

USSOCOM acting in its service-like role of equipping SOF, has mentioned non-lethal weapons in the current draft of the SOCOM Technology Investment Plan. Considered a general roadmap rather than a hard set of requirements, it includes the following passages:

⁴³ Ibid., p. 17 and (notes 22, 27). Richard Kokoski, Chapter 11. "Non-lethal weapons: a case study of new technology developments," in *SIPRI Yearbook 1994* (Oxford: Oxford University Press, 1994), pp. 370-372.

⁴⁴ U.S. Army, *AirLand Operations: A concept for the Evolution of AirLand Battle for the Strategic Army of the 1990s and Beyond*, TRADOC PAM 525-5, 4 August 1991, and U.S. Army, *Operations Concept for Disabling Measures*, TRADOC PAM 525-XX, 1 August 1992 discuss the non-lethal niche between diplomacy and conventional warfare and an operations concept for disabling measures, respectively.

⁴⁵ Swett, Nov 1993, pp. 2-3. Articles in *Aviation Week and Space Technology*, describing non-nuclear electromagnetic pulse (EMP) warheads for USAF ALCMs, and the carbon-fiber warheads on Navy Tomahawk cruise missiles used against power plants in Iraq would tend to indicate more operational interest than expressed at the policy staff level. David A. Fulghum, "ALCMs Given Nonlethal Role," *AW&ST*, 22 Feb 1993, pp.20-22, and "EMP Weapons Lead Race for Non-Lethal Technology," *AW&ST*, v138, n21, 24 May 1993, p. 61.

SOF requires the capability to selectively damage and/or immobilize personnel and/or critical equipment/systems. To render key personnel ineffective for a selectable period of time, without their having memory of the events that transpired and to incapacitate the enemy's capability to manufacture, transport, emplace or employ war matériel. These systems/weapons will fill the vacuum between diplomacy and lethal force in regional conflicts. . .

SOF requires the capability to engage selected targets with Non-Lethal, Soft-Kill, Anti-Material, Low-Collateral Damage or System Disabling Measures. This variable effects system will provide the option, based on the mission and sensitivity, to destroy and/or immobilize personnel and/or critical equipment/systems.⁴⁶

These statements were composed by the SOF R&D community with inputs from the operational community. They have not been formally validated, and the word "requires" in the first paragraph should be understood in an informal sense. Also, interest is evidenced by some recent Small Business Innovative Research (SBIR) solicitations and funded proposals.⁴⁷

2. Non-Lethal Weapons (NLWs)

The U.S. Army has referred to Low Collateral Damage Munitions (LCDMs) in work done by ARDEC and has also referred to "disabling measures" as well as nonlethal technologies in TRADOC pamphlets. Dr. John B. Alexander of Los Alamos National Laboratory describes a primarily anti-matériel concept option that he calls, non-lethal defense.⁴⁸ The National Institute of Justice refers to a "Less-Than-Lethal" initiative to emphasize the intent not to kill and the safety of the use of such weapons, but does not deny the possibility of their use being lethal. Some authors in the Army, the ARPA, and the Defense Nuclear Agency talk about "soft kill" or "mission kill" when referring to NLWs. Some in DoD policy circles prefer the description "disabling" while some feel it has a

⁴⁶ USSOCOM, *Technology Investment Plan* (draft), 17 August 1993.

⁴⁷ Advertised by the Defense Technical Information Center (DTIC) for the Army, ARPA, and SOCOM, the following examples are of solicitations (and funded contracts) for non-lethal weapons research. Army: A92-004, (funded ID#: 92ARD-051, 92ARD-050, and 92ARD-042); ARPA: A94-093; and SOCOM: 94-006. These SBIR programs may be accessed and viewed on the internet through DTICs server. Not all of the solicitations necessarily result in funded proposals.

⁴⁸ John B. Alexander, "Non-Lethal Weapons as Force Options for the Army," LANL, LA-UR 94-861, 28 March 1994.

pejorative connotation. Other DoD officials prefer to speak of "controlling" individuals and "disabling" matériel. By looking at the second paragraph of the USSOCOM Technology Investment Plan quoted in the preceding subsection the reader will see that SOCOM tries to communicate most of the different ways to describe NLWs. The U.S. Global Strategy Council speaks of "nonlethality" as a new paradigm. While in this thesis, nonlethality is only used as a means of describing the overarching subject of NLWs and their relation to other methods or tools.

The following expanded functional definitions for the categories of NLWs will be based upon the current DoD definition listed in the introduction of this work. After reviewing these categories, we will briefly discuss a possible definition for non-lethal tools to help clear up the debate over the fuzzy distinctions within elements of psychological warfare, electronic warfare, and information warfare as to what qualifies as a NLW.

Please refer to the proposed DoD NLWs definition on page one, as we apply its elements to define the functional categories. Also, refer to the following wiring diagram in Figure 2.2, which graphically depicts the typology of the categories of NLWs that we will describe. This typology will be used for the subsequent analysis in Chapter V. The definition states that the intent of the weapon should be to incapacitate personnel or matériel. Using this as a starting point, let us break down the dimensions and means to accomplish this incapacitation.

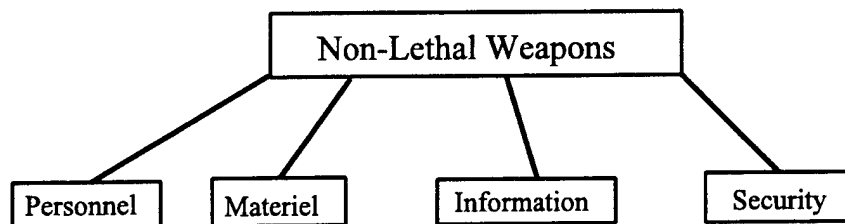


Figure 2.2- NLW Typology

a. Personnel

This functional category includes the nondestructive, invasive or non-invasive measures of suasion, coercion, compellence, or force that are applied against personnel. The dimensions of this usage include the physical (time and space) and morale aspects of the effects on personnel. The paralyzing, isolating, or disabling aspects of the weapon should be temporary in nature. The word nondestructive as used in this definition means that the intent of the temporary effects should be completely reversible with no lasting ill effects. The means of a particular NLW to accomplish this task will be evaluated in Chapter V by using the goal of a particular mission (Chapter IV) and the perceptual model that is developed in Chapter III from the control war paradigm.

b. Matériel

This functional category includes the relatively reversible non-destructive or precisely-limited destructive (discriminate - with almost zero collateral damage) use of force against matériel. The matériel affected could include weapons, supplies, or equipment. The

dimensions of this usage of this force also include the physical (time and space) and morale aspects as they relate to the ability of personnel to utilize these assets. The same effectiveness evaluation method listed above for personnel directed NLWs also applies for matériel directed NLWs.

c. Information

This functional category includes the relatively reversible non-destructive or precisely-limited destructive (discriminate - with almost zero collateral damage) use of force against information sources or systems. The attack on information could be conducted either against the media, the software, the transmission medium, or the receiving capability for it. To discriminate this category from the larger subject of information warfare or C2W, we will limit the discussion to NLW usage in the framework of tactical and operational missions in the case studies. We realize that there is an overlap and blurring in the distinction of these subjects. Nevertheless, besides the brief mention later in this section of non-lethal tools as opposed to weapons, we consider this debate beyond the scope of the thesis.

d. Security

This functional category concerns a task rather than a target. Because of the importance of the physical security of our own personnel, facilities, and vehicles in reducing or eliminating friendly casualties, we feel it is necessary to examine the emergence of specific specialized types of NLWs that have a purely self defense role to play in the successful completion of missions in MOOTW and PCO missions. This category is therefore examined separately from the general offensive and defensive mission use of personnel and matériel targeted NLWs. Obviously sensors and intelligence play a role in this function of self-defense, but are they to be considered NLWs? The following discussion of non-lethal tools should help clear up the rationale for the differentiation of the categories.

3. Non-Lethal Tools

The nature of the definition for NLWs suggests an active means for incapacitating personnel or matériel. The question arises of just what precisely are NLWs in the context of the already developed fields of PSYOPs and Electronic Warfare and the emerging field

of Information Warfare. A few examples will be reviewed here to help clarify this issue and provide a differentiating line between tools and weapons.

PSYOPs are planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign government, organizations, groups, and individuals. The purpose of a PSYOP is to induce or reinforce attitudes and behavior favorable to the originator's objective. But do the tools of PSYOPs necessarily qualify as non-lethal weapons?

The answer depends on whether the PSYOP has an active role to play in the incapacitation of an enemy in battle. For example, the dropping of leaflets or broadcast of radio transmissions may influence the morale and will to resist of a combatant. But these tools, effective as they may be in an integrated approach to the defeat of an enemy, cannot be shown to be immediate active contributors to his incapacitation. On the other hand, the "sky shouting" tactics of the British in their counterinsurgency battles in the 1950s in Malaya when directly targeted at individuals or groups were directly responsible for the surrender of guerrillas.⁴⁹ Also similar "sky shouting" loudspeaker tactics were used by U.S. special forces flying in C-47 aircraft in Korea to warn dispersed enemy troops to surrender under threat of napalm attack. Marching orders were given and sometimes directly followed that lead the enemy to small allied patrols on the ground to be processed as prisoners of war.⁵⁰ Clearly, PSYOPs are conducted primarily with non-lethal tools, but the last two examples do indicate the use of PSYOPs measures directly as non-lethal weapons in an active contribution to the defeat of the enemy.

Electronic Warfare measures similarly face the same dilemma as PSYOPs measures in this definitional problem. When considering electronic attack and the direct use of

⁴⁹ Bruce Hoffman, *British Air Power in Peripheral Conflict, 1919-1976* (Santa Monica, CA: The RAND Corp., R-3749-AF, October 1989), pp. 54-56.

⁵⁰ Colonel Michael E. Haas, USAF, *Air Commando!* (Hurlburt Field, FL: AFSOC History Office, 1994), p. 15.

electromagnetic weapons to degrade, neutralize, or destroy the enemy combat capability⁵¹, one would have to conclude that this is an example of NLWs usage. However, electronic warfare support measures and electronic protection are usually related to passive detection measures or hardening. One example of a cross-over may be the development of aircraft countermeasures like isotropic radiators (Appendix A) that actually destroy the seeker head of an attacking missile and therefore go beyond the passive or spoofing nature of traditional countermeasures.

Similarly, in a discussion of information warfare, many of the measures or techniques that may be related to this subject encompass support tools like media campaigns, which must be considered non-lethal tools. However, in C2W, for example the use of a computer virus that attacks the enemy's information systems, incapacitates his command and control net, and results in the subsequent surrender of his dispersed forces, should be considered a NLW. This discussion should clarify that not all measures used in these aforementioned fields should be considered as NLWs. Additionally, the discussion of them as non-lethal tools should reduce confusion as to what we may conveniently call the combat support measures they offer under the broader heading of non-lethality.

4. Advantages of Non-Lethal Weapons

The debate over NLWs has produced some consensus as to the possible advantages for their use. In the PCO and MOOTW environment explored in this thesis, NLWs could represent an intermediate strategic means to coerce cooperation or compel the end of aberrant behavior. Used as an adjunct to an internationally sanctioned effort, they could serve as a gap filler to complement diplomacy and economic measures without resort to lethal force.⁵² In fact these measures may be more precisely "tunable" to make sure they apply pressure to the leadership without unduly burdening the general population. It can be argued that NLWs meet the *jus in bello* requirement of Walzer's "just war theory," providing decision makers

⁵¹ CJCS MOP 30, 8 March 1993, *Command and Control Warfare*, p. A-1, Appendix A Terminology for Electronic Warfare.

⁵² Barry, 1994, pp. 33-34.

with options to comply with the proportionality-of-means test and the requirement to limit noncombatant casualties.⁵³ Additionally non-lethal measures could possibly offer several other advantages over lethal force. They may be more legally and morally defensible. They may offer less political risk with more benefits. Operationally, they may offer more appropriate military effectiveness, flexibility, and better protection for our troops. In tactical situations, they may be force multipliers when used in conjunction with traditional means. And finally, they may be technically feasible, supportable, and affordable.

5. Constraints on Use

One of the first constraints on the use of NLWs is the actual in field use proof that they are not lethal and that they do not produce undesirable side effects. Besides the necessary constraints of political and military utility, the legal, ethical, social, informational, environmental, and economic constraints to the use of a particular NLW must be addressed. Because we are considering their use in PCO or MOOTW missions across a wide spectrum of conflict, the issue of the laws of war becomes enmeshed with international law and local statutes that may complicate the use of NLWs. Different social or cultural norms also impact the use of non-lethals, local populace and the international media perceptions may affect the suitability of NLWs. The issue of environmental effects, obviously a selling point for non-lethals may also be a detriment. Some of the long term effects of the possible chemical or biological NLWs may not be known until after the weapons have been fielded and used. Likewise little is known of the effects of repeated use of high power microwaves (HPM) near humans (except for accidental dosages) or animals. Similarly, in addition to their possible immediate blinding effects, repeated exposure to lasers or laser-type energy may have long term effects on vision that do not show up for years.

⁵³ Michael Walzer, *Just and Unjust Wars: A Moral Argument With Historical Illustrations* (New York: Basic Books, 1977) 3-20, pp. 51-73. Barry et al reinforce this point, 1994, p. 37.

C. SUMMARY

We believe that it was worth reviewing the detailed definitions for the preceeding two concepts on the front end of this thesis. This appreciation for PCO "special wars" and non-lethality should serve us well as we jump into the following larger theoretical discussion and case study analysis that incorporates their use. The acronym PCO will not be found in any DoD publication, although contingency and contingency planning are both discussed in Joint Pub 1-02.⁵⁴ The attempt to provide a functional typology for non-lethality has been constrained by the diverse fields and tools that get lumped into this category. Others that we cited in the definition have contributed to the first three categories that were used to get our arms around the subject. The last category of security, as a task-based versus target-based category, was added into the discussion for this thesis because of the priority for minimum friendly casualties in these PCO type scenarios. Finally, the concept of non-lethal tools was used to bridge the grey area between what may be considered a weapon in a particular situational use.

⁵⁴ Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 23 March 1994. The definition for contingency includes the issue of emergency response of military forces to uncertain events and the need for plans, rapid response, and special procedure to ensure readiness. Necessarily, the time for the U.S. to develop a tailored force will be constrained by the need to "come as you are."

III. THEORETICAL FRAMEWORK

A. SHIFTING PARADIGMS

Most will agree that we live in a time of immense transitions. Technological, societal, informational, economic, and geopolitical forces are combining in an accelerative and synergistic manner to alter the way people perceive global events and interactions.⁵⁵ This environment provides the backdrop for the concomitant discussion of a paradigm shift in the way we theoretically view and conduct warfighting operations in the emerging Information Age.⁵⁶ An understanding of how we wage war is crucial to the analysis of the conduct of operations, missions, and sub-missions and the use of tactics, techniques, weapons, and tools within the larger strategic context of a given campaign or PCO. As such, the following paradigmatic approach satisfies the need to see where we have been and where we might be going in the conduct of warfare. After reviewing attritional and maneuver paradigms and then examining in more detail the *control warfare* paradigm as presented by Arquilla (and under the umbrella of recent RMA debates), we will develop an operational model and a modified list of principles of *control warfare*. We will later use these in Chapter V to analyze and order the requirements, tasks, and specific non-lethal technologies that may prove useful for mission accomplishment in future scenarios similar to our case studies.

1. Review of Attritional and Maneuver Paradigms

As mentioned in Chapter I, the protracted attritional battles by massive armies in World War I represented the culmination of the industrial revolution's effect on warfare among the large developed nation-states. Prior to industrialization, siege warfare gave way to the Napoleonic strategy of *striking at the vital point with maximum force* as the dominant military paradigm. Clausewitz, as an admirer of Napoleon, wrote that, "the best strategy is

⁵⁵ W. Kirk MacNulty, "The Paradigm Perspective," *Futures Research Quarterly*, Fall 1989, p. 35.

⁵⁶ Gen Gordon R. Sullivan, Col James M. Dubik, "War in the Information Age," *Military Review*, April 1994, pp. 46-62.

always to be very strong, first in general and then at the decisive point."⁵⁷ With the onset of the support structures of production line assembly, railroads, and telegraphs; and the use of machine guns, artillery, and magazine-fed rifles, forces employed sustained lethal effects at a magnitude greater than any time in the past. As such, these changes resulted in the unification of a whole country's war-making capability and resources with the forces on the front lines of the field of battle. A decisive victory by a single army could not bring about the defeat of the enemy any longer. These massive forces were systematically organized into separate corps and divisions who were tasked by command organizational structures to grind on in sequential campaigns and battles to exhaust the resources of the enemy. This model emphasized a rigid hierarchal chain of command and conformity for the mass-produced equipment and trained troops engaged in battle. And this model still remains with us today, in part surviving both world wars and as the organizing force behind our victory in the Cold War,⁵⁸ which may be viewed as an economic and military containment war of attrition.

Overlapping this paradigm, mechanization (enabled by the powerful internal combustion engine), radio communication, and aircraft design provided the technological boost for the emergence of maneuver warfare. The revolution in maneuver warfare was assisted by technology, but not necessarily driven by it. The French had developed the tank to a high degree in the inter-war period, but they spread them out and appended them to an existing defense-oriented organizational structure.⁵⁹ The organizational leap to maneuver was brought about by Hitler's belief in *Blitzkrieg* and its proponents. After viewing a demonstration of tank maneuver warfare in February 1935, he is reported to have stated,

⁵⁷ Cited in Van Creveld, 1991, p. 97.

⁵⁸ Gen Gordon R. Sullivan and Col James M. Dubik, April 1994, p. 48.

⁵⁹ Barry Posen, *The Sources of Military Doctrine: France, Britain and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984).

"That's what I need. . . That's what I want to have."⁶⁰ This went against the German Army leadership, who preferred to superimpose the technology on their current offensive doctrine rather than to experiment and innovate doctrinally to exploit its potential.

German blitzkrieg doctrine also made the disruption of enemy communications and control a priority at both the tactical and strategic levels.⁶¹ In lightning coordinated attacks with aircraft and tanks they not only accepted confusion and disorder and operated successfully within it, but through decentralization and their own communications advantages, they generated confusion and disorder.⁶² Soon the allies reacted to this doctrine and made their own innovative operational and tactical reorganizations to counter the new offensive style of the Germans. Combined arms maneuver techniques, used on both sides in mechanized battle, led to the return of attrition warfare, but this time "on wheels."⁶³

Besides the new equilibrium that came into effect, another criticism of the German doctrine was that a loose tie to high policy and the opportunism of blitzkrieg combined to eliminate any overarching doctrinal coherence. The strategic result was that there was a loss of operational purpose beyond the institutional goals of the military.⁶⁴ Many tactical successes and victories in battle resulted in no net higher end goal or purpose.

A similar lesson was relearned by U.S. Forces in Vietnam, where our counterinsurgency battle victories did not have the strategic focus to win in the "softer,

⁶⁰ Heinz Guderian, *Panzer Leader*, trans., Constantine Fitzgibbon (New York: E.P. Dutton, 1952) pp. 29-30. Professor R.H.S. Stolfi, a noted German historian at the Naval Postgraduate School in Monterey, CA, suggested in classroom discussions in 1993 that a better translation of the second sentence was "That's what I *must* have." See also, R.H.S. Stolfi, *Hitler's Panzers East: World War II Reinterpreted* (Tulsa, OK: University of Oklahoma Press, 1992).

⁶¹ Arquilla and Ronfeldt, 1993, Offer a concise anecdotal review of examples from Guderian's (1972) and Mellenthin's (1976) memoirs, (note 19), p. 163.

⁶² See William S. Lind, *Maneuver Warfare Handbook* (Boulder, CO: Westview Press, 1985), pp. 7, 11.

⁶³ Arquilla, 1994, p. 26.

⁶⁴ David Jablonsky, *The Owl of Minerva Flies at Twilight: Doctrinal Change and Continuity and the Revolution in Military Affairs* (Carlisle Barracks, PA: Strategic Studies Institute, May 1994), pp. 58-59.

subtler" aspects of the war that the enemy was winning.⁶⁵ This connection to high policy and to the nature of the conflict needs to be remembered, as it apparently was in DESERT STORM, when exploring the emerging paradigm of control warfare. The advocates of maneuver warfare also seem divided between the traditional idea of annihilation as the goal and the more progressive approach by some writers that disruption of the enemy and rapid victory with minimum cost is the goal.⁶⁶

Progressive business writers and speakers also suggest that with the fading of industrialism's governing concepts and the emergence of information age principles, the transformation of some societies will be as profound as the shift from an agrarian to industrial model.⁶⁷ Of course, it is also pointed out that the result will not be the complete elimination of industrial structures and institutions but the large-scale shift in the way they organize; moving from mass machine oriented, paced, sequential, continuous, long-run production to de-massified network oriented, near-simultaneous, continuous, short-run production.⁶⁸ These societal paradigm shifts and the debate over the nature of the evolution of maneuver warfare form the foundation for the study of the military technical revolution (MTR) which is virtually synonymous with the RMA. The interest in this subject is booming, but for the purposes of this thesis, we will limit our focus to the proposed control

⁶⁵ Arquilla and Ronfeldt, 1993, p. 151.

⁶⁶ Lind, p. 4. He discusses the traditional definition offered by Soviet Colonel F. D. Sverdllov in the study, *Tactical Maneuver*, "Maneuver . . . is organized movement of troops (forces) during combat operations to a new axis (line) and region for the purpose of taking an advantageous position relative to the enemy in order to deliver a decisive strike." Translated in *Strategic Review* (Summer, 1983), p. 88. On p. 6, he then discusses "maneuver" as Boyd Theory (conflict as a time-competitive observation-orientation-decision-action cycles) in which these iterative decision loops or OODA loops are cycled at a higher rate than the enemy until he loses his cohesion and can no longer fight as an effective, organized force. The outmaneuvered enemy is then comparatively easy to destroy or capture as a dispersed force at a low cost in friendly casualties.

⁶⁷ John Naisbitt, *Megatrends* (New York: Warner Books, 1982), p. 9. Tom Peters, Superintendent's Guest Lecture at the Naval Postgraduate School, 13 September 1993.

⁶⁸ Gen Sullivan and Col Dubik, April 1994, p. 47.

warfare paradigm as expressed by Arquilla, examine its component parts, suggest some principles and guidelines that may emerge, and in a strategy to tasks manner, investigate the operational implications for PCOs and the innovative use of weapons (both lethal and non-lethal) and other tools at the tactical, operational, and strategic levels.

2. Emerging Control Warfare Paradigm

We will now apply the systems analysis principles used in the control warfare paradigm to more clearly understand the role of information dominance and its link to the "enemy" modeled as a system.⁶⁹ The implications of this approach are that decisive victory may be obtained in knowledge-based military conflict by the use of "smart" quasi-network oriented forces who maneuver to disarm or paralyze the enemy as they continue to know his and their own disposition while simultaneously keeping the enemy blinded. The enemy can be concentrated, but still ignorant of what is going on. The more likely outcome is that he will become dispersed.

The first subsection will explore some of the concepts and themes that comprise the unified development of information dominance. The second subsection explores some current competing ideas for modeling the enemy as a system. In the third subsection, flowing from the models examined in the second subsection, we will propose a physical and morale model for the necessarily more complex political-military "enemy" that may be encountered in a PCO. In the fourth subsection, we will examine detailed modeling for this systems approach aimed at degrading strategic infrastructure and military forces. This discussion will be used as the basis for the development of some operational principles of control warfare and the underlying tenets that this paradigm suggests as possible modifications to the more traditional doctrine used in warfighting.⁷⁰ Finally, a shorthand reference will be developed

⁶⁹ Arquilla, 1994, p. 25. In his earlier work with Ronfeldt, he referred to this paradigm as *cyberwar* (Arquilla and Ronfeldt, 1992, p. 162, (note 7)). The two terms may be used interchangeably.

⁷⁰ Basis of Joint Pub 1, FM 100-5, and AFM 1-1 for list of principles of war as developed by J.F.C. Fuller's work in 1920,

to allow the reader to keep a focus on these changes in the underpinnings of such warfare at the tactical, operational, and strategic levels.

a. Information Dominance

As Arquilla and Ronfeldt state, the simplest and most accurate definition for information dominance consists of "knowing everything about an adversary while keeping the adversary from knowing much about oneself."⁷¹ The revolutionary aspect to this concept, which seems so straightforward that it could have been mentioned by Sun Tzu, is tied to the assumption that the following elements are present: 1) the greatly increased size of the modern battlefield (deep battlespace), 2) the greatly increased speed of command, control, communication, computer, and intelligence systems (C4I) to coordinate simultaneous, complex maneuvers (increased decision speed), and 3) organizational changes to a flatter, more network-oriented mobile force (greater connectivity) that is able to concentrate precisely at unexpected vital points in the battlespace. All this will combine synergistically to move "information dominance" from a supporting to a central role in determining the outcome of hostile engagements. As Arquilla states, historically, without these factors, and with conditions of uncertainty and chance, the Clausewitzian "friction" and "fog of war," superior firepower, and tactical innovation contributed to a mixed role for information in warfare:

... while knowing more has often provided the *necessary* conditions for achieving startling victories, information dominance alone has rarely generated *sufficient* conditions for winning. ... The solution to the problem awaited a new paradigm, one that would seek, rather than to exhaust or annihilate, to paralyze.⁷²

This concept of information dominance does not mean that only technical experts within the decentralized organization will be in receipt of information, but that commanders at all levels will share a unified "big picture" that is constantly updated with real-time sensor inputs. Arquilla calls this "'topside,' a central understanding of the big picture that enhances the management of complexity." Deep operations by SOF provide

⁷¹ Arquilla and Ronfeldt, 1993, 141.

⁷² Arquilla, 1994, p. 25.

some of the tenacles that reach around the enemy and provide the ground truth that feeds this "topside" even as the SOF elements pursue their mission objectives.⁷³

With this concept of information dominance in mind, the tools for gathering the information for a PCO would necessarily include the following elements. It may be best to discuss them in three time phases as their need occurs before and after the start of hostilities. The first time phase is the period months or even years in advance of a potential contingency in a particular region (far term). The second time phase is the period right before our involvement in hostilities becomes imminent (near term). And, the third time phase describes the period after hostilities have commenced (engaged). To create an environment of information dominance, all this information needs to be available in an integrated and timely manner to the unified commander and the dispersed leadership conducting the operation.

First, the necessity to acquire early (far term) the fine-grained information needed on the physical and moral disposition of enemy forces and the interconnectivity of the adversary leadership suggests two issues. Ongoing peacetime research and documentation by analysts and area specialists should be combined with the early injection of HUMINT collection efforts in-theater during the beginning planning phase before a contingency operation is launched. This combination of *virtual* presence, as supported by the ongoing research of expert analysts, needs the *actual* presence of these HUMINT sources in-theater to generate in full a current real-time tapestry of events, personalities, and inter-relationships that will facilitate accurate assessments.

Second, as hostilities become more probable (near term), the collation of the above information with open source information servers and sensor-derived information (Imagery Intelligence (IMINT) and Signals Intelligence (SIGINT)) during this period would also be necessary for early prioritizing of potential targets. Third, when engaged with the

⁷³ Arquilla and Ronfeldt, 1993, and later lecture comments by Arquilla, 1994. In *Cyberwar is Coming*, (note 10) cites David Gelernter, *Mirror Worlds, or the Day Software Puts the Universe in a Shoebox. . . How It Will Happen and What It will Mean* (New York: Oxford University Press, 1991), p. 52., for the origination of the term "topside."

onset of hostilities, real-time reports, battle damage assessments, and debriefings from the field would be correlated with the information still available from the previously cited sources, and from near real-time reporting from national technical means, battle area sensors placed on the ground, in water, or in the air (low altitude UAVs, tier II+ or tier III long dwell high altitude UAVs, and manned tactical reconnaissance assets).

The intelligence cycle for processing this data - the collection, processing, production, and dissemination - would have to be greatly time-compressed to provide for the continuity of information dominance and situational awareness over the battle. This would dictate that the intelligence process be integrated horizontally across the "cycle" to parallel process the potentially overwhelming amount of data that would be flowing and that the intelligence-operations connection be tightened so that the intelligence officers were intimately familiar with the planner's needs and the operational commander's intent and the disposition and capabilities of their own forces as well as the enemies. This situation presents no small challenge; and the deficiencies noted in the DESERT STORM⁷⁴ air war and the underlying emphasis of some discussions on the subject of information warfare and C2W acknowledge this situation and the associated need to integrate joint intelligence systems, databases, and training⁷⁵ to provide the necessary connectivity, as well as, the processing power to deal with this daunting task.

b. The Enemy as System

To relate the concept of information dominance effectively and efficiently to action against the vital points or "centers of gravity" of an enemy, a systems approach will be utilized. Systems modeling proposals will be reviewed and investigated for their

⁷⁴ The inability of BDA processing to keep up with the single day planning cycle of the Air Tasking Order (ATO) once the Air War started is well described in Major Larry Grundhauser, Major Susan Mashiko, Major Hugh Hortsman, and Major Rick Anderson, "The Future of BDA," *Concepts in Airpower for the Campaign Planner* (Maxwell AFB, AL: Air Command and Staff College, 1993), pp. 89-92.

⁷⁵ Margaret Roth, "Information Overload," *Air Force Times*, January 24, 1994, p. 24. Martin C. Libicki and James A. Hazlett, "Do We Need an Information Corps?," *Joint Forces Quarterly*, Autumn 1993, pp. 88-97.

applicability to the adversary in a PCO. For a baseline, the "Five Ring Theory," the systems-oriented approach used by Col John A. Warden III in planning the air campaign against Iraq, will be used.⁷⁶ As a general strategic model, it will be examined for its applicability to PCO actors. Modifications to his approach will be reviewed and suggested for the structurally different possibilities in less hierarchal, more network oriented adversarial organizations.

Warden's thesis is based on the following argument. Advances in technological hardware used for fighting have widened the distinction between the physical and the morale elements of combat power. His hierarchal prioritization of enemy "centers of gravity" into five concentric rings can be looked at from the top-down in the planning of a campaign to meet the desired ends by compelling the enemy command element (leadership) to cease fighting. This systems approach allows one to precisely target key physical nodes in a deep battle situation to make it physically impossible for the enemy to continue to fight even if he has rationally resisted earlier measured destruction of his subordinate centers of gravity. This results in the "strategic paralysis" of the enemy by the simultaneous and sequential attack on rank-ordered essentials within the enemy system.⁷⁷

Warden's model seems well suited for application in a conventional major regional conflict where the state structure is hierarchical and well defined. The strategic attack against Iraq serves as the defining example. The rank-ordered rings radiate out from the central leadership, to the organic essentials, to the infrastructure, to the population, to the fighting mechanism of the system (see Fig. 1). The rigid hierarchal leadership in Iraq offered a well defined target structure, indirectly if not directly, for attack. The open expanse of desert offered little cover and concealment for the dispersed structures or targets that would lead to the crippling of the combat power of the system. Although there were redundancies and cross-wiring in the outer rings of the system (backup communication capabilities, hidden

⁷⁶ Col John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: Pergamon-Brassey's, 1989).

⁷⁷ Col John A. Warden III, "The Enemy as a System," *Concepts in Airpower for the Campaign Planner*, pp. 7-8.

mobile scud launchers, and stockpiled logistics support materiel) continued air attack reduced the fighting mechanism capabilities to a minimum. But, in a contingency scenario where the organization of the enemy may be less well ordered and defined, a more network oriented model may serve to better map the connectivity between the vital nodes of power.

One suggested alternative to the Warden System is offered in an article also describing strategic paralysis.⁷⁸ The argument of Major Barlow's thesis is that the "national elements of value" (NEVs) that should be targeted differ from the centers of gravity that have been defined by Clausewitz, Douhet, Billy Mitchell, Liddell Hart, and Warden because they are interdependent and can compensate for each other.⁷⁹ He also argues that NEVs are more vulnerable when they are highly developed, such as in a country higher up on the industrial ladder. He quotes Major Alexander P. de Seversky from 50 years ago, when he observed that "total warfare from the air against an undeveloped country or region is well-nigh futile; it is one of the curious features of the most modern weapon that it is especially effective against the most modern types of civilization."⁸⁰ His notions of replenishment and substitution and the dynamic interplay of the NEVs recognizes that a tight operations and intelligence loop must be maintained because of the transient nature of the ranking of the NEVs in conflict. Constant reevaluation is necessary to evaluate not only the *degree* of vulnerability to attack, but also the *kind* of vulnerability. To avoid wasted effort, the attacker must understand how the enemy values his assets. This requires fine-grained intelligence that is continually processed and updated. The seven NEVs he uses for his discussion are as follows: 1) leadership, 2) industry, 3) armed forces, 4) population, 5) transportation, 6) communications, and 7) alliances. These are similar to the five rings of a Warden system, however the

⁷⁸ Major Jason B. Barlow, "Strategic Paralysis: An Air Power Strategy for the Present," *Air Power Journal*, Winter 1993, p. 4-15.

⁷⁹ Ibid., p. 10.

⁸⁰ Maj Alexander P. de Seversky, *Victory through Air Power* (New York: Simon and Schuster, 1942), p. 101-102.

connectivity, interdependence, and dynamic nature of their value is more network oriented than allowed for by the hierarchal Warden system.

Although every country has the same NEVs, their relative importance changes - depending on the circumstances. Individual leaders important enough to be NEVs are concluded to be rare today. However, he notes the following: "the destruction of one target set could be enough to collapse an enemy government, depending on the importance of the NEV and the speed and the thoroughness of its destruction, as well as the dependence, resiliency, and speed of compensation of the other NEVs in relation to it." Of crucial importance in this statement is the concept of the speed or tempo and the breadth of the attack. He describes the four elements critical to strategic paralysis that determine the strength or the weakness of this strategy: 1) aerospace control, 2) technology, 3) vulnerable infrastructure, and 4) vital targets. Barlow reviews the effect of a failure in either technology or aerospace control as they limit strategic paralysis and cause a conversion to other war forms, namely annihilation (maneuver) and attrition, respectively. Although he avoids a direct discussion of the effectiveness of this strategy on rogue state or non-state actors in contingency operations or MOOTW environments where infrastructure and vital targets are not so clearly physically defined.

c. A Merged Systems Approach

Further examination of Barlow's NEV system demands consideration of the broader aspects of the political and military dimensions of PCOs. If we use the earlier definition of PCOs developed in Chapter II, the three phases of the PCO create a dynamic situation where the military, political, economic, and informational levers of power are orchestrated and balanced so that at any one time one or all may be in play. As the operation transforms from a strictly militarily oriented forced entry to a mid-term policing, peace, and presence operation, to a longer term FID and civil affairs assistance operation, it is easy to see that the NEVs should also be modeled in a morale spectrum. As Dr. Larry Cable points out in his presentation on Peace Operations, the U.S. really has a long experience with "special wars." From our revolution to the Indian Wars and the Phillipine Insurgency to the

short Marine excursion into Lebanon in 1958 and the Airborne and Marine deployment to the Dominican Republic in 1965, interesting success stories can be gleaned where we understood the political/military nature of these conflicts and acted correctly.⁸¹

As the twelve year British experience in the "Malayan Emergency" illustrated, in these "special wars" all elements of national power need to function in an exemplary commitment to the unified end goal in an integrated manner.⁸² In the counterinsurgency operation that the British and the Malaysians mounted, military operations, special operations, policing, civil affairs assistance, economic aid, and informational campaigns were used in interconnected ways to win the "hearts and minds" of the people. This phrase, coined by the British High Commissioner and Director of Operations, General Sir Gerald Templer, may have had more far reaching meaning than the superficial context that the "hearts-and-minds" analysts later attempted to apply in building their models.

Accordingly, they worked within the broader context of the Cold War paradigm and considerations of modernization as they developed their prescriptions for externally applied programs for security, good government, and progress in third world countries without closely examining the particular uniqueness of the constraints facing the particular supported regime.⁸³ Likewise, the cost-benefit approach as defined by Leites and

⁸¹ Briefing by Dr. Larry Cable, University of North Carolina - Wilmington, 2 Feb 1995, for the SO/LIC Curriculum Speaker Series at NPS, Monterey, CA.

⁸² Bruce Hoffman, *British Air Power in Peripheral Conflict, 1919-1976* (Santa Monica, CA: RAND, R-3749-AF, October 1989), pp. 37-57. This work primarily emphasizes the aerial aspects of this integrated struggle. For a detailed review of the Briggs plan and General Templer's execution of it, see Edgar O'Ballance, *MALAYA: The Communist Insurgent War, 1948-1960* (Hamden, CT: Archon Books, 1966), p. 76-176. The dogged persistence and genuine desire of the British to understand in fine detail the context and content underlying the serious predicament of their colony and their sustained desire to save it from the Chinese Communists is probably an example beyond the scope of present acceptance of cost for the U.S. But it serves as a seminal example of what economy of force measures properly integrated together with fine-grained intelligence and a coordinated leadership structure can accomplish. It is beyond the scope of this thesis to argue the relative merits of competing counterinsurgency theories.

⁸³ Sir Robert Thompson, *Defeating Communist Insurgency: Experiences from Malaya and Vietnam* (London: Chatto and Windus, 1966), pp. 35-36. For another point of view see, Samuel Popkin, *The Rational Peasant: The Political Economy of Rural Society in South Vietnam* (Berkeley: University of California Press, 1979).

Wolf⁸⁴, may have been limited by similar constraints as it tried to define the complex inter-relationship of the government (authority) to the society, and the similar linkages of the counter-state (rebellion) to society.

Similarly, D. Michael Shafer's criticism of both these approaches focuses on their misperception of the underlying circumstances and bureaucratic constraints in the specific case studies he examines.⁸⁵ He argues for a rigorous analytic examination of the specific conditions governing each potential counterinsurgency engagement. By questioning the basic tenets that the existing prescriptions are based on in each particular case, he seems close to the mark in his criticism of the existing work on counterinsurgency, but his gloomy non-answer to the question seems limited by his case selection. If he had selected Malaya as one of his cases (instead of excepting it⁸⁶), he might have carried his conclusion further and stated that it was the fine-grained understanding of the different dimensions of the emergency in Malaya that the British used as the source of their strategy for solving the problem. For the British, it may be that countering the psychological aspect of the guerrillas' strategy fell out of their plan to defeat the enemy in detail. This interplay and synergy of all the integrated tools that the British assembled was of a higher priority than either the physical or psychological targeting aspects alone when measuring the effect on their enemy's NEVs (infrastructure and armed forces).

Winning the hearts and minds was therefore a symptom of a successful multi-dimensional integrated campaign based on an early control warfare paradigm approach. By using an inflow of fine-grained information, gathered from HUMINT and their own actual networked presence across the countryside, and by constantly questioning their prescriptions and policies in Malaya, the British evolved a campaign based on a process-oriented approach,

⁸⁴ Nathan Leites and Charles Wolf, Jr., *Rebellion and Authority: An Analytic Essay on Insurgent Conflict* (Chicago: Markham, 1970), p. 42.

⁸⁵ D. Michael Shafer, *Deadly Paradigms: The Failure of U.S. Counterinsurgency Policy* (Princeton, NJ: Princeton University Press, 1988), pp. 104-132.

⁸⁶ *Ibid.*, p. 15.

linking strategies to tasks in adaptive and innovative ways to accomplish clearly stated mission objectives as efficiently and effectively as possible. Additionally, they had the tenacity to stay the course for over twelve years, demonstrating the *perseverance* and *legitimacy* also necessary to win.⁸⁷

As such, the post-Cold War era provides us with the unique opportunity to examine and research many specific regions without the constraint of having to shoehorn them into an ideological struggle between us and the Soviet Union. The information age tools becoming available for our use and good old fashioned field work may help us understand the unique aspects of distinct regions, states, sub-state actors, transnational organizations, and peoples.

Although future PCOs in which we become involved may contain insurgencies, civil wars, ethnic conflicts, or religious struggles within their larger context, they will probably be different from the bipolar ideological differences assumed as prevalent during low intensity conflict in the Cold War era. It is important to remember that the physical and morale forces in battle will still *both* be a factor on the outcome if the strategic organization does not map out neatly as a hierarchical organization.⁸⁸ In contrast to Warden's view,⁸⁹ the fine-grained understanding of these morale factors, may be possible through information dominance as described above. As such, the possibility exists that strategic

⁸⁷ It is not surprising that these two concepts are listed as principles of MOOTW in Joint Pub 3-07 (draft), II-7.

⁸⁸ Warden, 1993, p. 7, Col Warden insightfully quotes Clausewitz, "physical is to the morale as three is to one" he as reevaluates the seemingly coequal aspects of both in battle. He then states, that our increased capability to destroy the physical side of the enemy through deep battle, precision strikes, allows one to disable a strategic entity, from a industrial state to a guerrilla organization by only concentrating on the physical factor. I agree that this works well for modelling a hierarchically based industrial state, but I disagree that it effectively targets more network oriented foes in a MOOTW environment where restrictive ROEs are necessary and where the grain size of the entity goes down to the level of the individual as explained in Chapter II.

⁸⁹ Warden, 1993, p. 7., He states, "Conversely, the morale side--the human side--is beyond the realm of the predictable in a particular situation because humans are so different one from another. Our war efforts, therefore, should be directed primarily at the physical side." In low-intensity conflict, this luxury is just not always available.

paralysis would be ineffective when targeting these more holistic, network structures, that are based on a shared belief or value system, whether based on culture, ethnicity, religion, or nationality in the moral dimension. The possibility also exists that in fractionated or unstable states, our attack, if not carefully planned, may serve to only split the state along these cleavages, create more unwanted chaos, and not address the problem or defeat the enemy.

Also, by viewing network oriented morale factors along with the physical dimensions of a conflict, we may also see the necessity for our military leadership and forces to understand the tenets of the statesman's craft of deterrence, compellence, and crisis management. These statesman's tools offer strategic leverage when applied to the tactics and strategies used at the tactical and operational levels to persuade and negotiate with the enemy as a semi-autonomous sub-state actor and affect his motivations, even as conflict seems imminent or is ongoing. These sub-state actors may be more susceptible to the craft of the statesman, in a mixed pol-mil environment, when applied by military leadership.⁹⁰ In fact, under a control warfare paradigm, the coercive measures of NLW seem a perfect accompaniment to allow a military commander who has already established forceful credibility to negotiate more effectively than a non-engaged civil authority. Observe the comparison of the of the models for the Warden five ring system, Barlow's NEV model, and the new Molecular model that this argument suggests in Figure 3.1. The dynamic response to conflict that the Molecular model illustrates, will be discussed in the next subsection.

⁹⁰ Alexander L. George, David K. Hall, and William R. Simons, *The Limits of Coercive Diplomacy* (First Ed., Boston, MA: Little, Brown, 1971, Second Ed., Boulder, CO: Westview Press, 1993). The authors note that the relative motivation of the two sides in a conflict exerts critical leverage on outcomes, since the central task of a coercive strategy is "to create in the opponent the expectation of unacceptable costs of sufficient magnitude to erode his motivation to continue what he is doing" (pp. 26-27). In planning strategy against an unconventional foe, it's imperative to consider the nature and strength of the adversary's motivation. Understanding the reasons for cohesion in combat, and then targeting these morale factors would seem to dovetail with the argument suggested by Col. Wm. Darryl Henderson in *Cohesion: The Human Element in Combat* (Washington, D.C.: National Defense University Press, 1985), pp. 2-8, that small-unit cohesion will have a significant impact on determining who wins and why.

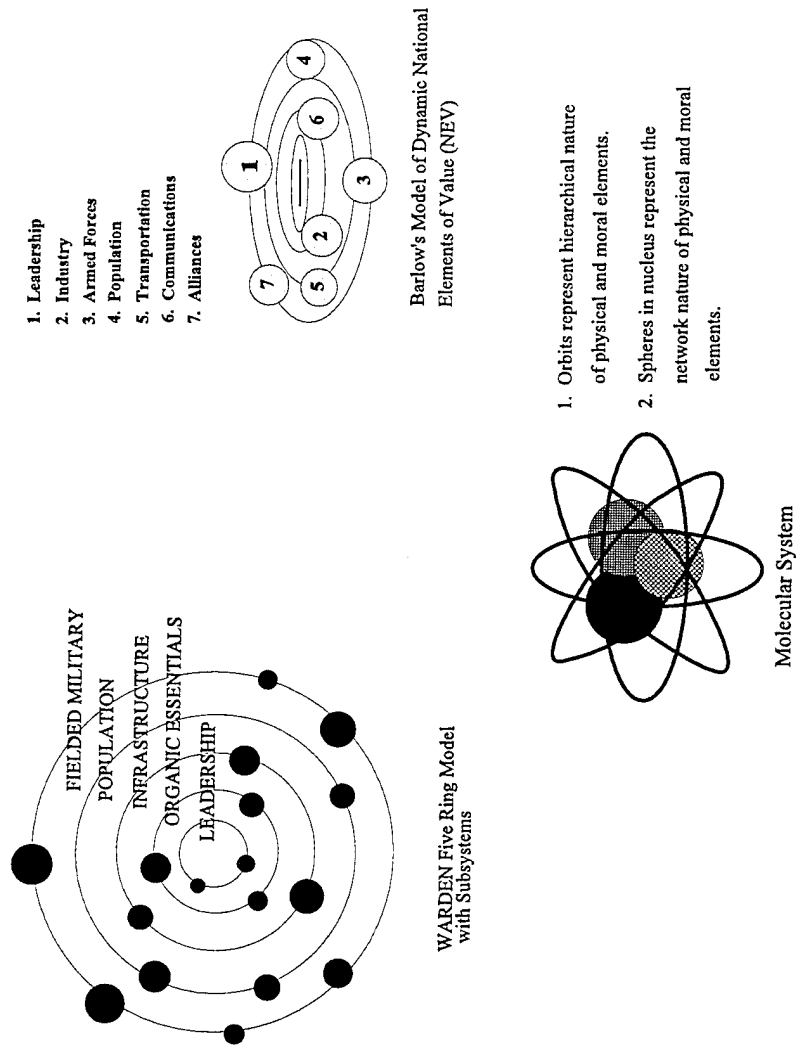


Figure 3.1 - Comparison of Strategic System Models

d. A Molecular Model for PCOs

As suggested by the Molecular model in Figure 3.1, The physical and morale elements of a strategic system may exhibit both a hierarchical and network oriented nature. As Barlow illustrated with his NEVs, the physical elements of a system may be interlinked. As we discussed earlier, the motivations of a population (or leadership) may extend down to the village, clan, family, or individual level.⁹¹ This permeation is especially prevalent where religious, ethnic, or other sociopolitical factors have a fundamental effect on the nature of the conflict and the moral drive and behavior of the participants feeds on their beliefs.

Early recognition of the intricacies of this situation in a PCO becomes imperative. The patience, durability, and costs in blood and treasure it may take to counter this fine-grained networked adversary may not warrant risking U.S. national assets in an intervention. But likewise, a detailed appreciation of this situation under a control warfare paradigm may reveal the hierarchical and network based levers, that must be addressed with the proper type of forces and OGA and/or NGO operations to influence the leadership, population, or social infrastructure in a meaningful way. However, we believe that the interesting sociological, psychological, and anthropological arguments on the specifics of these issues are beyond the scope of this present investigation. We seek the more modest goal of offering a better starting point for modeling military, political, informational, and economic actions against an enemy by considering the morale and physical hierarchies and networks.

Therefore, the Molecular Model is proposed only as a conceptual tool to illustrate the richness of the alternatives possible as a result of an attack when a large,

⁹¹ If these network-based morale elements are deeply imbedded in a population's ethos, then as similar to fractal geometries suggested in Chaos Theory, they would exist in the same relationship whether viewed at the strategic, operational, or tactical levels. In T. Tagarev and D. Nicholls, *Identification of Chaotic Behavior in War* (to be published in the 1994 Annual Conference of the Society for Chaos Theory in Psychology and the Life Sciences), p. 144, they use the *Koch snowflake* example, illustrating that its perimeter looks the same whether viewed with the naked eye or with a powerful microscope. Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security* (Vol 17, No. 3, Winter 1992-93), 59-90, reframes *On War* in defense of Clausewitz and this "new" reality.

complex, and non-linear strategic system is engaged. See Figure 3.2 for illustration of possible notional results in the following generic cases: 1) an attack on an essential physical element like the electrical power grid of a developing nation, 2) an attack on hierarchal leadership of fundamentalist country with internal cleavages between political and religious factions, and 3) an indirect attack on the network-based differences in a strategic system that divide a population.

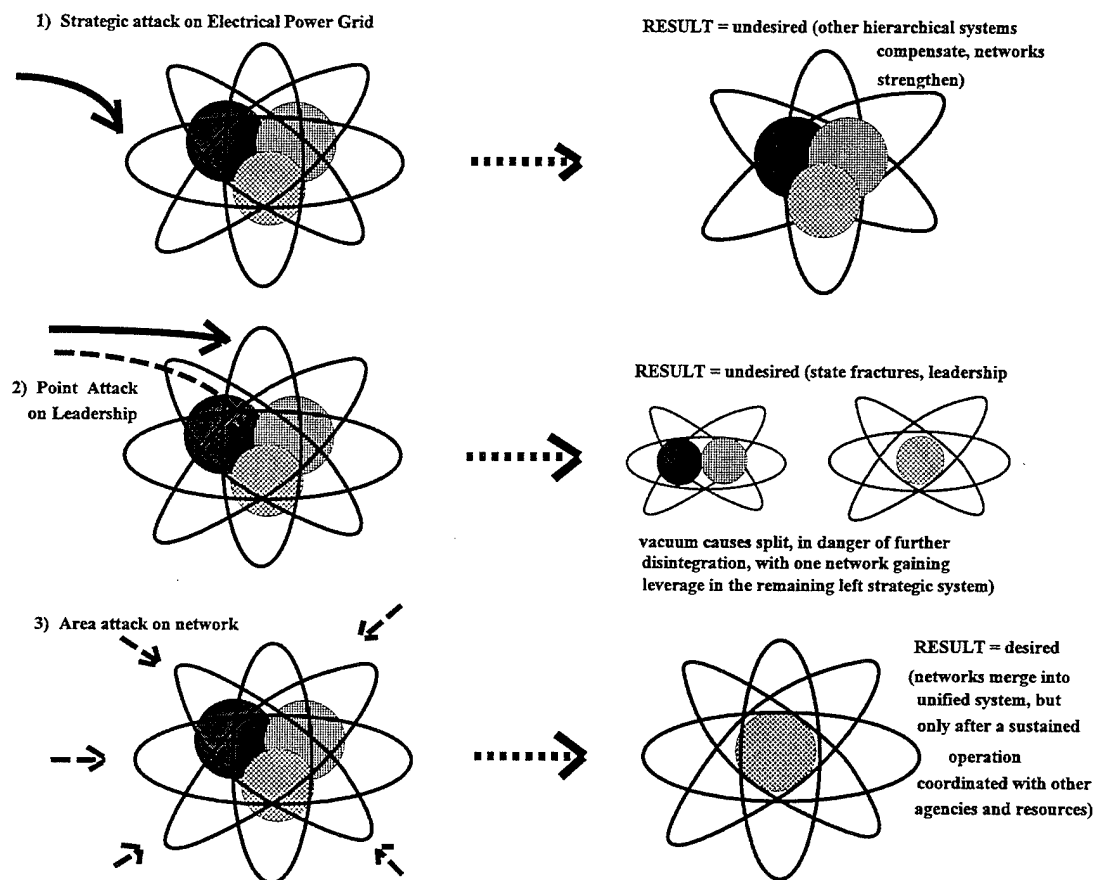


Figure 3.2 - Possible Modal Responses of Molecular System

In the first case, the one possible notional result was that the other hierarchical systems compensated. For example, if the society was mainly agrarian, sales of fuel for heating and powering portable generators for essential use could partially offset the loss of

the power grid. On the other hand, the locally networked resources, gathering of wood, coal, and other fuels, and a reversion to a more primitive lifestyle would bring the networked elements of power to the fore. The undesired result would be that the system, although damaged, would exhibit a resilience not expected if we do not take into account the interrelated and substitutional hierarchical nature of the other elements and the dispersed toughness of the network oriented aspects of the physical and morale elements.

In the second case, the point attack on the hierarchic leadership may lead to the fracturing of the system because of morale and physical cleavages in the elements of the state. In Figure 3.2 the dotted arrow is used to suggest the indirect attack on the networks of the system that would be driven by the direct attack on leadership. This seems to have been one of the U.S. concerns in the Gulf War for a post-war Iraq. As such, the strategic attack on enemy leadership must take into account the hierarchic and network-based factors that will affect the outcome of such action.

In the third case, a network-based indirect offensive effort by a coordinated use of military, political, economic, and informational elements of power to help unify a fragile nascent strategic system is suggested as a success. The qualifying requirement is that this must be conducted under a control warfare paradigm where information dominance leads to a process control methodology where continual adaptation and review of effectiveness are used to control the non-linear nature of change in these complex systems.

The primary constraint is that even with the extremely efficient use of our own elements of power, the MOOTW situations suggested in Joint Pub 3-07 (draft) would still demand patience and durability and may take considerable time to resolve successfully. The Principles of MOOTW suggested: Objective, Unity of Effort, Security, Restraint, Perseverance, and Legitimacy (especially the last three principles), would demand strong long-term backing of the U.S. public and the international community in addition to the engaged systems. The likelihood of this is questionable. This engagement strategy would demand close monitoring of the costs versus U.S. interests and objectives going in so that

the end game or desired result is judged of sufficient interest for the expenditure of blood, treasure, and time that may be necessary to attain the goal.

B. REVOLUTION IN THE PRINCIPLES OF WAR?

The preceding discussion of the emerging control warfare paradigm suggests that the strategic implications will be far-reaching. Such revolutionary changes in the character of warfare "have profound consequences for global and regional military balances."⁹² The advantages, opportunities, costs, and risks that this type warfare suggests are brought into clearer focus by examining the specific general guidelines that it may overlay over existing principles of war.⁹³ The following section briefly details the specific impact on the way the principles of war and the tenets associated with the successful conduct of operations are influenced by a force that operates in "special wars" with information dominance as the centerpiece of its strategy.

Information dominance, itself thus takes on the dual nature of a combat element and a "new" principle of war. The following examination is not meant as a revisionist look at the time-tested doctrine of the U.S., and no principles of war that exist are to be neglected. It does attempt to synthesize some unifying concepts for viewing the synergy of the principles in an environment where the technological and organizational changes in a properly lead force allow it to operate with a magnitude greater knowledge in an enlarged battlespace with agility and high decision speed. At the same time, it does not dismiss the fact that fog and friction still exist, only that their influence is a magnitude less than for forces operating outside this paradigm.

⁹² Andrew F. Krepinevich, Jr., "The Coming Revolution in the Nature of Conflict: An American Perspective," in *The US Air Force Roundtable on the Revolution in Military Affairs* (report prepared by SAIC, January 1994), p. 2.

⁹³ For this discussion the principles of war as outlined in Joint Pub 1, Joint Pub 3-0, Army FM 100-5 (June 93), AFM 1-1 (March 1992), and Army FM 100-20/ AFP 3-20 - Objective, Offensive, Mass, Economy of Force, Maneuver, Unity of Command, Security, Surprise, and Simplicity are used. Additionally the Joint "concepts" derived from the principles in Joint Pub 1 (November 1991) and the supplemented principles of MOOTW from Joint Pub 3-07(D) and the special operations application of the principles will be incorporated in the discussion.

1. Guidelines for Viewing Principles and Tenets

The first major implication is that control warfare demands an expanded understanding of the *objective*. The more complex and complicated purpose of conflict in PCO environments goes beyond the singular destruction of the enemy's armed forces. In these operations, our forces will be bounded and constrained at the strategic, operational, and tactical levels by political sensibilities and limited policy objectives, domestic and international concerns for loss of life, media coverage, and situations with mixed combatants and civilians. The result is that our primary purpose will usually be to paralyze the enemy's forces and attack his other elements of power, both physical and morale, to destroy his *will* to fight. Clearly defining decisive and attainable objectives will be a more complicated task. The knowledge tools of control warfare will be necessary for the fine-grained determination of whether our strategic aims are successfully met at all levels of engagement. As such, new measures of effectiveness and definitions of mission success need to be addressed within the context of *unity of effort*⁹⁴ where other tools and actors are supported by or supporting the military effort. In Chapter V, we address this task when analyzing case study missions conducted in the three phases of a PCO, "special war."

The smart military organizations that carry out these objectives need to be intimately familiar with the *commander's concept* as well as his *intent*. *Unity of command* and *unity of effort* understanding needs to exist all the way down to the individual maneuver units. A task force oriented, flat organizational structure that is well lead and that has planned and trained together, rehearsed their roles, and has an intimate understanding of the concept of the operation is required. Its cohesiveness, nurtured in the deliberate planning stage and employed forcefully in opening engagement operations, will provide the framework for change as this same force flexibly responds to the rapid changes in subsequent operational engagements. With real-time connectivity to the operational leadership for "by exception"

⁹⁴ See Joint Pub 3-0 (November 1991), pp. 21-22. and Joint pub 3-07(D) (July 1994), p. II-1 - II-5. Unity of effort emphasizes the need to carefully coordinate of the actions of the military JFC with the non-military agencies and organizations also involved in PCOs that have their own views of the objective of the effort.

guidance and "topsight," unit commanders need to be able to make judgements and operate semi-autonomously when required to aggressively seize the initiative when opportunities are presented.

The second major implication involves the use of smaller, more mobile forces in these control warfare based employments. The concept of *concentration*⁹⁵ gains leverage over the principles of mass, maneuver, and economy of force as singular elements. In these more agile operations, mass and quantity become relative issues. The quality of the force becomes more important than the quantity as the timing and synchronization evolve at a higher operational tempo to fight an enemy effectively dispersed by the supporting measures of a control warfare based campaign. The adaptive and constantly evolving innovative use of forces in space and time melds together maneuver and economy of force operations as we strive to concentrate forces and firepower against key NEVs rapidly and in unexpected ways.

This is not to say that quantity itself can be completely neglected. The security of our plans, the surprise and shock of our method of attack, the rehearsed tasks and specialized skills, and the local predominance of firepower for a specific period of time combine as the concept of *relative superiority*⁹⁶ supports the concept of concentration. Strategic, operational, and tactical agility also factor into any ability to realize the advantages of this expanded concept of concentration.

Once the above principles are put into action against an enemy and the initiative has been established, our higher decision clock-speed and knowledge abilities allow us to step back and examine how we want the individual campaigns within the operation to sequence. For an example of what knowledge or information dominance offer, an analogy to what we have described, "is rather like a chess game, where you see the entire board but your opponent sees only his own pieces: you can win even if he is allowed to start with additional

⁹⁵ Joint Pub 3-0, p. 22., and Joint Pub 3-05, p. I-6.

⁹⁶ CDR William H. McRaven, *The Theory of Special Operations* (Monterey, CA: Naval Postgraduate School Thesis, 1993), p. 11. CDR McRaven used this principle to view advantages and risks of small-unit discrete special operations missions. It may also be a useful tool to describe the time-dependent element bounding the time-window for concentration within missions in a PCO.

powerful pieces."⁹⁷ In addition to this first perspective on a game of chess, by undertaking an institutional approach to Boyd Theory⁹⁸ beyond its use as a model for tactical engagements and broadening it to encompass the operational and strategic levels, it is also like a chess game in which you get two moves to your slower adversary's one:

... by the time the slower side acts, the faster side is doing something different from what he observed, and his action is inappropriate. With each cycle the slower party's action is inappropriate by a larger time margin. Even though he desperately strives to do something that will work, each action is less useful than its predecessor; he falls farther and farther behind. Ultimately, he ceases to be effective.⁹⁹

This leads to his paralysis and defeat. The implications for this scenario are that information dominance allows you to dictate the pace for a sustained operation.

Engaging selectively where and when you determine it is advantageous, gives you an opportunity to take advantage of a concept that we will refer to as *tempo control*. Instead of being overwhelmed by the great breadth and depth of the battlespace and the extremely rapid tempo of decision cycles, the strength of a control warfare practitioner will be to seek larger spheres to define his deep battle stand-off strike capabilities and ever shorter notice, higher speed fusion and processing of information to more clearly and precisely define the shared real-time situational awareness of his enemy's disposition. Aerospace control, command of the seas, and land warfare dominance, in concert with information dominance, will provide the adaptability and flexibility for stepping back and dictating the tempo of a battle, campaign, or operation. Once tempo control is established, the fight can be fought on an adaptive and coordinated schedule as is deemed properly advantageous to the execution of operations supporting your end objective - and there is little the enemy can do about it.

⁹⁷ Arquilla and Ronfeldt, 1993, p. 142.

⁹⁸ John Boyd, *Fleet Marine Force Manual Number 1* (March 1989), Lind, *Maneuver Warfare Handbook* (1985), pp. 4-6. and his lecture *A Discourse on Winning and Losing* (unpub). All discuss his theories. Boyd's theories are based on the premise that if you observe, orient, decide, and act (OODA loop) at a quicker tempo than your adversaries, you could get inside their "time-mind-space" and drive them into confusion and chaos. Everything your adversaries do would always be a half-count behind what is unfolding before them, and this would cause panic in their minds.

⁹⁹ Lind, 1985, pp. 5-6.

Incorporated in this concept is the principle of the offensive and the preservation of freedom of action. The locked in initiative that tempo control offers, keeps you on the offensive even when you choose not to immediately act against an enemy that presents no potential threat. For persisting operations in static positions, tempo control relies on the your force's ability to observe, orient, decide, and act to secure point and area defenses, while maintaining the enemy at standoff ranges, until assistance and/or a counter-attack can be mounted by the use of rapid concentration of appropriate firepower from a quick reaction force. In the latter phases of PCOs, this reaction capability may include a mix of lethal and non-lethal options commensurate with the environment of the operation.

The last major implication that control warfare offers is the broadened concept of *environmental degradation*. Under the umbrella of information dominance, environmental degradation is defined as the ability to degrade the enemy's physical (time and space), morale, and informational dimensions such that he is overwhelmed by the chaos around him and can not effectively mount a fight to defend himself. In the physical dimension, his forces, logistics, materiel, and weapons, and equipment need to be adversely affected to tip the playing field to your advantage. Natural and man-made features and conditions and our ability to operate more effectively in them, constitute the first level of this degradation. As such, the terrain, weather, and night may be used to our advantage. With night, adverse-weather mobility and fighting capabilities, we may effectively engage the enemy in an environment in which he is not well trained to operate. The fine-grained information we need to make these determinations must come from information dominance. The man-made resources we may employ include non-lethal measures to disable his forces and equipment with low collateral damage or economic backlash, interdict his lines of supply, and provide for the security of our troops and weapons systems. Our effective use of standoff fires or barriers, stealth, camouflage, hardened facilities, and armor protection also are dependent on a thorough knowledge of his capabilities and how to degrade them most effectively.

In the information realm, we need to be able to sever his capability to command and control his forces or to communicate his intent. Or we may use deception to inject

misinformation or disinformation into his systems to cause confusion or dispersion of his combat assets. Electronic warfare and measures like computer viruses or clandestine monitoring or entry into information systems and massaging of sensor data may aid this effort.

These measures also have a morale impact on the enemy. A direct example would be PSYOPS campaigns that have a direct deleterious effect on the morale and informational dimensions of the enemy's capability. Finally, surprise and shock are important factors reducing his capability to respond effectively. All of these dimensions need to be considered in an integrated, if not synchronous attack on the ability of the enemy to effectively engage us. All of these environmental degradation measures need to be orchestrated to gain and maintain the initiative. Once this is accomplished, these measures also aid *tempo control* and *concentration* efforts and support the expanded *objective* of the JFC. The coordination of this effort will have to be determined by the operational commander. It is obvious that some of these measures may be subject to counter-measures and may offer a wasting effect if used more than once. Therefore, it is imperative that they be employed in an environment of continuous innovation so that the enemy does not know what to expect next.

2. A Perceptual Shorthand for Knowing the Enemy and Yourself

As Basil Liddell Hart once wrote, "The only real objective is the enemy."¹⁰⁰ Judging his capabilities and intent has always presented a difficult task. Knowing his capabilities has concerned commanders, staffs, intelligence officers, and agencies almost to the exclusion of dealing with the more nebulous subject of intent. "But knowledge of enemy intentions can be equally or even more important, to the extent that it sheds light on enemy plans and allows us to take timely and effective action to blunt them."¹⁰¹

The shorthand reference that we will use to model probable courses of action for the enemy and for ourself will be based on the generic categorizing of options that define his/our

¹⁰⁰ Lind, (1985), p. 123. Cited by Lind in a discussion of the concept of the objective.

¹⁰¹ Joint Pub 1, (November 1991), p. 33.

capabilities for engagement in the given battlespace using his/our decision cycle as viewed under the paradigm of control warfare. We refer to these generic categories at the tactical, operational, and strategic levels as the capability to *shoot, move, communicate, know, and react*.¹⁰² Their relationship is modeled in Figure 3.3. This cognitive map links knowledge as the centerpiece to a continual inflow of information from other resources and from the parallel assessment and feedback from the engagement of the other capabilities. This represents a generalized depiction of how a force adaptively cycles through the means to engage in battle at all levels of conflict under the control warfare paradigm. An in depth explanation of how the capabilities are manifest at the different levels follows.

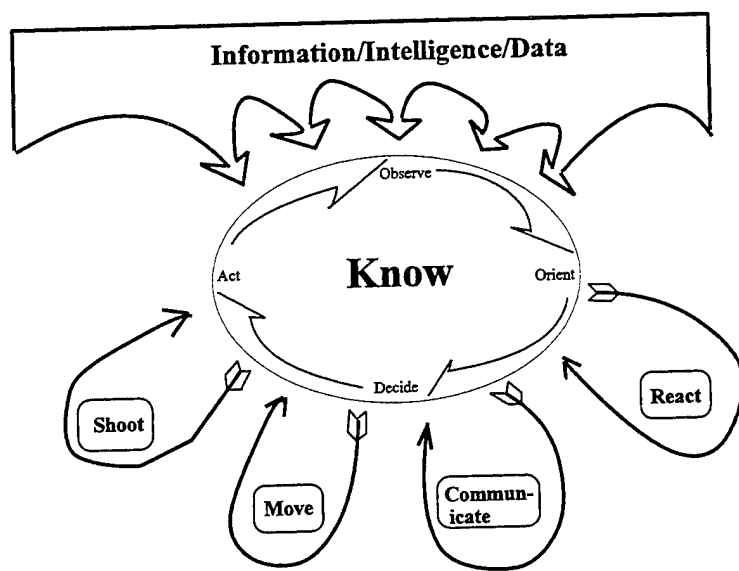


Figure 3.3 - Shorthand Cognitive Map

¹⁰² Practitioners of maneuver warfare will recognize *shoot, move, and communicate* as the necessary abilities a force needs employ and to coordinate together to successfully wage maneuver warfare. Credit goes to MAJ (Ret) Dick Meadows, from a talk given in November 1993 in the SO/LIC speaker series at the Naval Postgraduate School for the inspiration to use these terms in an expanded discussion for control warfare.

In the beginning of the thesis we discussed the adaptive range of options that SOF has at its disposal for mobility and communications, and the necessity to develop adaptive options for intermediate measures between the use of deadly force and the use of no force for SOF. The theoretical discussion of control warfare brings us full circle back to the reason for exploring non-lethal options for PCO environments where restrictive ROEs demand the ability to employ "or shoot" non-lethal options as part of the continuum of response capabilities. At the tactical level, the four capabilities ringing knowledge can be thought of as representing the following: 1) *shoot* - the actual weapons used to fight the battle, whether provided by supporting fires or the combatant himself, 2) *move* - the air, land, and water vehicles and dismounted movement capabilities of the individual soldier, 3) *communicate* - the connectivity at the local battle area and also upwards and downwards to the operational command and strategic information resources, and 4) *react* - the local capability to run the OODA loop and adapt to a changed situation. At the operational level, the four capabilities represent the theater level operational assets and capabilities the JFC can utilize to fight his tactical task forces in a networked and coordinated manner.

At the strategic level, the four capabilities are manifest in the military and non-military options the NCA has available to use as coercive measures that range from diplomatic negotiations, to economic sanctions or supports, to international informational campaigns, to non-lethal and lethal use of force. "Shooting" at this level implies the execution of strategies more than the physical use of a weapon, although different authors have recently suggested the viability of employment of non-lethal means as an incremental step between diplomacy or economic sanctions and the actual employment of lethal force in MOOTW scenarios.¹⁰³ Movement involves the force projection capabilities of the Air Force, Army, Navy, Marines, and USSOCOM and the sealift or strategic airlift necessary to put them in place in a theater. It could also involve the dispatch of diplomatic agents or emissaries. Communication involves the global information capabilities of military and

¹⁰³ Col Barry, May 1994 (draft), p. iii. and Alvin and Heidi Toffler, (1993), p.134.

commercial satellites, and direct exchanges between the NCA and the JFC and regional and international leaders involved in the conflict. Reaction is based on rapid upchannel reporting and the "real-time" international media. At the strategic level, the NCA needs to be "plugged into" what is going on in theater to enable the warfighting CINC or JFC to respond appropriately without unduly interfering in his method. Their decision time on strategic matters should not become the limiting factor to the prosecution of operational and tactical tasks.

One limit on this decision loop is the processing or verification time needed to confirm the validity of out of channel reports that may be instantaneously reported in the media. This brief summary of various manifestations of the specifics associated with these general capabilities at all levels is only suggested to stimulate thought on the layered and interleaved possibilities. This perceptual device should be useful to keep in mind as the case studies are discussed and analyzed.

IV. CASE STUDIES

A. BACKGROUND AND INTRODUCTION

To preface the case studies, we will quickly review the actions leading up to the execution of Operation JUST CAUSE in Panama in 1989, with a thumbnail sketch of the forces arrayed for the initial military operations of the *coup de main*. This provides the framework for the study of subsequent follow-on missions, the details of which will be used to explore how NLWs might be employed. Of particular interest in determining the niche for NLWs will be the way the forces operated with respect to the concept of control warfare, the external constraints, and the nature of the particular phase of the overall operation. The case studies include some emerging missions and situations that may be faced in future PCOs.

The first case study reviews follow-on operations to "win the west." It reveals a strictly measured use of force in an operation to coerce the surrender of the fractionated remains of the Panamanian Defense Force (PDF). The title of this study could well be "Military Diplomacy."¹⁰⁴ The second case study reviews the loss of control in the aftermath of the invasion in the urban areas of Panama City that led to civil unrest and widespread looting. It is questionable whether dealing with this situation was a SOF or GPF responsibility, but it will explore the causes of this loss of initiative that adversely impacted one of the primary goals of the operation - restoring a stable democratic government of Panama. The possible use of NLWs to support security needs and the actions of these forces will be explored.

B. JUST CAUSE

The American attack on Panama in the early hours of December 20, 1989 was the end result of a failure in deterrence, compellence, and crisis management. Diplomatic discussions and economic sanctions, and at least two attempts to allow General Manuel

¹⁰⁴ Stephen J. Cimbala, *Military Persuasion: Deterrence and Provocation in Crises and War* (University Park, PA: The Pennsylvania State University Press, 1994) describes a series of operations.

Noriega to abdicate power without "fear of facing criminal prosecution either in Panama or the United States,"¹⁰⁵ failed. Numerous contingencies were developed in the late 1980s featuring, if necessary, military intervention as a last resort. The foreign relations problems for the U.S. escalated with the continued recalcitrance of General Manuel Noriega, as he progressively trampled democracy in Panama, glorified in his blatant involvement with the drug cartels, crushed coup attempts, and ended up proclaiming himself "maximum leader of the struggle for national liberation" on the 15th of December 1989.¹⁰⁶ Although the number of violations of the 1977 Panama Canal Treaty by the Panama Defense Force (PDF) reached the thousands,¹⁰⁷ the outright attacks on U.S. soldiers and dependents brought the situation to a head. The Death of First Lieutenant Robert Paz (USMC) and the subsequent harassment and detainment of witnesses to the PDF shooting, Navy Lt. Adam J. Curtis and his wife, Bonnie, on 16 Dec 1989 was the match that finally lit the fuse to the operation. The need for intervention became imperative. As discussed, this thesis considers two mini-case studies for examining the possible role for NLWs, but first, some background on the military operations in the coup de main that kicked the door open and its objectives and constraints will help to frame these case studies.

1. What was JUST CAUSE?

The unique nature of the attack, considered by most as a *coup de main*¹⁰⁸, also has elements of a forced entry *coup d'etat*/preemptive direct action/*fait accompli*/psychological operation/civic action/stability operation/nation building effort - in short, it was a special

¹⁰⁵ *New York Times*, 26 November 1988, interview with José Blandon, Noriega's consul general in New York.

¹⁰⁶ Lt. Gen. Edward M. Flanagan, Jr., *Battle For Panama: Inside Operation Just Cause* (Washington, D.C.: Brassey's, 1993), p. 37.

¹⁰⁷ On May 18 1989, the U.S. Defense Department reported more than 1200 violations of the Panama Canal treaties in the past fifteen months. Flanagan, p. 19.

¹⁰⁸ Lorenzo Crowell, "The Anatomy of Just Cause: The Forces Involved, the Adequacy of Intelligence, and Its Success as a Joint Operation," in *Operation Just Cause: The U.S. Intervention in Panama*, ed. Bruce Watson (Boulder, CO: Westview Press, 1991), p. 67.

operation writ large.¹⁰⁹ The national objective in Panama was long-standing, brief, and broad: Remove Noriega and restore democracy. These two national objectives translated into four military objectives: Protect U.S. citizens; defend the canal; restore democracy; and capture Noriega. Based on these objectives, the joint planning guidance from the Joint Chiefs of Staff followed: Use maximum surprise; unify the command structure; minimize collateral damage; use the minimum force necessary; plan no evacuation of noncombatants; and plan for postcombat operations to restore democracy in Panama. The guidance was converted into a mission for General Thurman, the commander in chief (CINC) of the Southern command.

In the concept of the operation to accomplish the mission, the generally stated goals of the attack, were threefold. Phase 1: Combat operations at the onset designed to neutralize and fix in place the PDF, capture Noriega, install a new government, and protect and defend U.S. citizens and key facilities. Phase 2: Stability operations to ensure law and order and begin the transition to support a newly installed government. Phase 3: Nation-building that supports the Endara government to include restructuring and training the new government.

This last phase would eventually be turned over to the Department of State and other interagency organizations as the U.S. government would assist with the economic and political rebuilding of Panama. These phases were intended to and in fact did overlap, with no clear breaks between them.¹¹⁰

To accomplish this goal, the commander of joint task force south (JTFSO), Lt. Gen. Carl W. Stiner said:

... there were certain key things that we had to do. We knew we had to knock out the [PDF central headquarters in Panama City] Comandancia, to neutralize the command and control. We knew we had to take down the police and most of the institutions of government because they, too, were run by the PDF. We knew that we had to take on those PDF units that could influence this action. If we did that - and we did it all simultaneously to completely paralyze

¹⁰⁹ Thomas Donnelly, Margaret Roth, and Caleb Baker, *Operation Just Cause: The Storming of Panama* (New York: Macmillan, Inc., 1991), pp. 59-60, 399.

¹¹⁰ Edward M. Flanagan, Jr., pp. 40-41. Listed from Joint Chiefs of Staff briefing following Just Cause.

them and neutralize them - anything left would be sitting out there with no guidance, no connectivity, no instruction. We could then go after them separately.¹¹¹

Gen Stiner realized that the Blue Spoon plan, which was to become Operation JUST CAUSE, needed to deliver a simultaneous and crushing blow to the PDF and Noriega. The required defensive maneuvers could be minimized if complemented with offensive action to eliminate the threat from the PDF units to the 15,000 potential American hostages in the Panama City area. The defensive mission would otherwise be a nightmare. Better to neutralize the Panamanians to prevent them from striking.

2. Who Conducted JUST CAUSE?

The force that accomplished this action was ostensibly under the control of Gen. Maxwell R. Thurman as Commander in Chief (CINC) SOUTHCOM, with a clean line of command and control up and down from his location on Quarry Heights.¹¹² Lt. Gen Carl W. Stiner, commanding the XVIII Airborne Corps, was his hand-picked commander of joint task force south (JTFSO), acting as the single point of responsibility for developing, training, and executing the contingency exercise code named Blue Spoon.¹¹³ With Stiner acting as Thurman's "war fighter," as Blue Spoon matured from Operations Plan (OPLAN) 90-1 to OPLAN 90-2 and then was renamed Operation JUST CAUSE, he commanded all the GPF and SOF forces in theater.

The GPF elements included nearly the entire 7th Infantry Division (Light), one parachute brigade of the 82d Airborne Division, a mechanized battalion from the 5th Mech Division, a battalion-sized task force of Marines, and the in-place 193d Light Infantry Division. Air support came from the 830th Air Division, the 24th Composite Wing at

¹¹¹ Donnelly, p. 59.

¹¹² Malcolm McConnell, JUST CAUSE: The Real Story of America's High-Tech Invasion of Panama (New York: St. Martin's Press, 1991), pp. 27, 40. The command relationship was streamlined and simple. Up from Thurman, it went to the chairman of the JCS, General Colin Powell, to the Secretary of Defense, Mr. Cheney, to President Bush. Thurman was the single command point in theater that gathered national level guidance and sent it down to his warfighter, Lt. General Stiner.

¹¹³ Donnelly, p. 55. Direct quote from Thurman to Stiner as he thrust a finger in Stiner's chest after his change of command ceremony for TRADOC at Fort Monroe (late 1989).

Howard, and the organic Army helicopter lift and attack capabilities from the above units. Additional combat support and combat service support units, such as the 41st Area Support Group and 1109th Signal Brigade provided key general support to the entire operation.

The SOF elements included the three battalions of the 75th Ranger Regiment, task forces of SEALs and special boat forces from the Naval Special Warfare Group 2, and SF from the Army's 7th Special Forces Group, and special mission unit personnel. Air support for SOF came from the Army's Task Force 160th Aviation, and the Air Force's 1st Special Operations Wing from Hurlburt Field, FL. All these forces, as well as PSYOPs and Civil Affairs belonged to USSOCOM. But one organization was necessary that could act as the centerpiece for coordinating all these SOF units in the execution of this operation. Stiner's subordinate commander for coordinating all the SOF elements was Maj. Gen. Wayne A. Downing,¹¹⁴ as the commander of his joint special operations task force (JSOTF). Effectively, the de facto operational command for the first five days was turned over to Gen Downing,¹¹⁵ as the supported commander, commanding the JSOTF as well as coordinating with the supporting conventional forces assigned to the other task forces¹¹⁶ - thus, this arrangement, although sometimes fluid and complex,¹¹⁷ resulted in unity of command with the JSOTF running the *schwerpunkt* efforts for the war.

The initial battles and successes on D-day for seizing the immediate objectives of JUST CAUSE mentioned above are well covered elsewhere in the cited open literature on the operation and will not be re-evaluated here.¹¹⁸ The unique situation that developed after

¹¹⁴ Flanagan, p. 63.

¹¹⁵ Donnelly, et al, p. 113.

¹¹⁶ Briefing by CDR Carly (ret), previously Commander SEAL Team 4, in Feb 1994, NPS SO/LIC briefing series.

¹¹⁷ Flanagan, pp. 107-108. Discussion of the chopping back and forth of units between task forces and the "Panzer Gruppe" of Major Donovan (S-3, 4/6th Inf) which ended up being chopped to the JSOTF for 18 days.

¹¹⁸ Donnelly, pp. 135-290; Flanagan, pp. 73-205; and McConnell, 21-240 include many primary references for the initial battles.

the main objectives were secured on D-day of JUST CAUSE illustrated that JTF SO and the JSOTF involved in accomplishing the operation would have to rapidly adapt and innovate when confronted with the new reality they had imposed on the remnants of the PDF and dignity battalion forces in the Panama City/Colón areas and the 5th Military zone PDF garrisons out west. Proper fulfillment of its new role as a state actor while mopping up the outlying districts also demanded compliance to the highly restrictive ROE imposed to minimize damage and injuries, and promote a smooth transition for the democratic government of Panama. With this introduction, the exploration of the essential tenets making up the *emergent control warfare* character of the JSOTF forces will be now be presented.

3. Control Warfare in JUST CAUSE

The rising influence of technology on battle has lead to a proliferation of new concepts of information warfare and "knowledge" war. In fact, a JCS document, "Command and Control Warfare,"¹¹⁹ grapples with this subject from a top down perspective. Researchers at National Defense University are developing a paradigm for this subject.¹²⁰ However, both these references seem to be putting the cart before the horse - that is putting technology first as the driving factor for knowledge warfare.

¹¹⁹ CJCS MOP 30 (Issued - 17 July 1990, 1st revision - 8 March 1993).

¹²⁰ For example, the article in the Autumn 1993 *Joint Forces Quarterly*, "Do We Need An Information Corps?," by Martin C. Libicki and James A. Hazlett, approaches the subject from the viewpoint of massification (Toffler's Term). These researcher's may heed Gen Chuck Horner's U.S. Space Command briefing (AIAA, Monterey, CA: May 1993) in which he lambastes his own community as "...space geeks, who were doing their waltz in their own tepee," when discussing the operational spin and inputs he injected into that organization. The lack of standardization in information systems and networks is atrocious - and needs to be addressed. But , as Gen Horner might say, the various players need to come out in the open where the warriors are preparing for battle. The last thing we need is another specialized stovepipe bureaucracy that defines doctrine for the war fighter.

These case studies will proceed from the assumption that "man is the center"¹²¹ of this revolution. The organizational transformation, currently aided by technology, that is allowing mobile forces to emerge like those assigned to USSOCOM with the highest readiness of any peacetime joint military reaction force in United States history is driven by mission. The JSOTF in Panama adheres well to the rudiments of Arquilla's and Ronfeldt's concept of *control warfare* as developed in Chapter III.

The JSOTF excelled because the melding of its component parts creates a synergistic effect on the capability of the organization as a whole. The JSOTF was a mobile force that was well prepared for contingencies. When employed it provides room for maneuver, concentrates firepower rapidly in unexpected places, and can rapidly reform and regroup to react to a fluid situation with a range and variety of responses.

The JSOTF had a horizontally constructed, quasi-network based task force structure that had the best command, control, and information systems that were currently available to carry the *commander's intent* to its dispersed units. Similarly, with many rehearsals and detailed training the decentralized tactical leadership clearly understood the commander's underlying *concept*. This system also allowed battlefield commanders and individual task force aircraft, by remaining constantly apprised of the overall tactical situation beyond their objective, to make intelligent decisions and react relatively autonomously to support the JSOTF *commander's intent*. Likewise, the JSOTF commander is also supplied with "real time" information to allow him to maintain "top-sight" for strategic purposes.¹²² When necessary, he went forward to put his own eyes on the target to aid operational decision making. The corollary to this is that with the grasp of these information tools, the JSOTF knew where and what the enemy was doing even while denying him from knowing its exact disposition - tipping the environment of uncertainty in its favor.

¹²¹ In reference to the oft-quoted refrain of Professor R.H.S. Stolfi at the Naval Postgraduate School when referring back to Clausewitz, Fall 1993.

¹²² Arquilla, et al , 141.

For shorthand reference, these abilities will be referred to as the capability to *shoot, move, communicate, know, and react*. A critical component of this conceptual framework is the ability to dynamically cycle through this process rapidly in accordance with Boyd's OODA loop¹²³ - to operate at a higher decision and action "clock" speed than the adversary. A simple analogy of this effect to Mohammed Ali's (Cassius Clay's) refrain: "Float like a butterfly, sting like a bee," relays the idea of operating at a higher tempo than the adversary over a continuous span of time until he is exhausted and finally boxed in and defeated.

To establish not only the advantage of speed that assists in the pivotal moment of a particular engagement (McRaven's concept of *relative superiority*), but to combine it with knowledge, allows one to sort options for *environmental degradation*, dictate the *tempo control*, manage *concentration* efforts, and continually refresh the entire joint force with the intent and concept of the expanded definition of the *objective* of an enlarged sustained operation. This captures the essence of the advantage offered by fast thinking, knowledge warfare applied at the merged tactical, operational, and strategic levels - in short, *control warfare*.

Using this capability the force must still undertake individual operations in compliance with the principles of special operations as related in CDR McRaven's thesis,¹²⁴

¹²³ John Boyd, *Fleet Marine Force Manual Number 1* (March 1989) *Maneuver Warfare Handbook* (Boulder, CO: Westview Press, 1985), pp. 4-6. and his lecture *A Discourse on Winning and Losing*. All discuss his theories. Boyd's theories are based on the premise that if you observe, orient, decide, and act (OODA loop) at a quicker tempo than your adversaries, you could get inside their "time-mind-space" and drive them into confusion and chaos. Everything your adversaries do would always be a half-count behind what is unfolding before them, and this would cause panic in their minds. What I saw in Panama at times was a force that was a few full clock cycles ahead of the adversary. Even when a misstep was made the JSOTF was able to regroup and still prevail because the enemy still had recovered from the shock of events preceding the misstep. We considered ourselves very lucky. But, in retrospect it appears we were responsible for "making our own luck."

¹²⁴ William H. McRaven, *The Theory of Special Operations* (Monterey, CA: NPS Press, 1993), p. 11. While the six principles listed have universal application at the small unit level and McRaven's idea of *relative superiority* is a very useful tool for evaluating discrete elements of an operation like Just Cause. Simplicity, security, repetition, surprise, speed, and purpose need the perceptual lens of control warfare to expand their application to the emerging tenets listed. The doctrine that needs to address this environment has to be able to focus on the larger quasi-network knowledge advantages of the organization tasked to operate in this environment and to illustrate how it overcomes the "fog" of war.

but analyzed in context, by observing the indicators that define the above developed variables in a broader vision. Additionally, this discussion would be remiss not to discuss the key advantages offered by the subject of selection and leadership as put forward by retired Colonel Rod Paschall.¹²⁵ Besides having excellent leadership at the top of the JSOTF, it is hard to measure the added value of innovative and resourceful, well disciplined operators leading and executing these challenging missions. For most of the emerging missions in these complex integrated operations, there will be no "cookbook" answer or doctrinal solution. The forces executing these mission have to understand the principles and tenets of control warfare and make their own real-time decisions on what applies and what the best course of action will be given the constraints of the environment they face.

C. MILITARY DIPLOMACY IN THE WEST

1. Establishing the Framework For the Western Situation

A brief outline will be presented to establish the setting for the western situation. Then, for the case study itself, an in depth reconstruction of events using primary and secondary references, will be analyzed with respect to both the tenets of crisis management, compellence, and deterrence; and *control warfare*. The commanding environment that *tempo control* allows, makes room for the employment of an expanded form of "military diplomacy." The ad hoc innovative organization of the forces conducting this "Military Diplomacy" will be explored not only to see how effectively they handled crisis management tasks with economy of force and concentration, but, more importantly, for this thesis, to later analyze the niche for NLWs that these missions may have offered.

¹²⁵ Rod Paschall, *LIC 2010: Special Operations & Unconventional Warfare in the Next Century* (Washington DC: Brassey's (US), Inc., 1990), pp. 84-86. Leadership and soldier selection models, as well as education and training, for the SAS, Delta, and The U.S. Army Rangers are discussed as they relate to the essentially human dimension involved in the future of special operations warfare and its knowledge capabilities. Col. Rod Paschall, USA (Ret) was Delta commander from 1980-1982.

2. Winning The West

Davíd, capital of Chiriquí province, was the Panamanian version of the "Wild West." It was also on the list of PDF strongholds that U.S. forces would have to seize if they were to forestall a protracted guerrilla war. It was home base for Lt. Col. Luis del Cid, a member of Noriega's SEM, the war council that he packed with cronies. Commanding the 5th Military District, he was effectively the "boss" of PDF military operations in Panama's western frontier. Like Noriega, he was also under U.S. indictment for drug trafficking.¹²⁶

Military District 5 represented the last hope of resistance for Noriega. The Mountains of Chiriquí held a strong and well armed PDF and dignity battalion contingent. Del Cid had acted decisively after the American invasion. Stating that he would fight until the end: he mined the Malek airfield in Davíd, blew a hole in the runway, and retreated with his headquarters staff to the fortified mountain village of San Andres.¹²⁷ To top off the situation, del Cid was also sitting on one of the largest weapons depots in Panama.

The immediate reaction of JTF SO and the JSOTF was to do nothing with the outlying forces who were effectively cut off and dismembered by the D-day attacks. This policy was a result of priorities. Until the situation was in order in the central area of Panama (and with our advantage of tempo control), outlying forces would be ignored as long as our intelligence sources indicated they were staying put. In relation to crisis management theory, the JSOTF inadvertently created a cooling off period for allowing the remnants of the PDF and Digbats to reconsider their position.

In stark contrast to the confused situation that existed between the U.S. and Panama before JUST CAUSE, immediately after the start of hostilities, the overwhelming nature and intensity of the military capabilities unleashed on the PDF displayed - in no uncertain terms - the overwhelming U.S. presence and the intent and willingness to use force when and wherever necessary. This acted as a framing event for firmly establishing a new status quo.

¹²⁶ Flanagan, p. 215., Donnelly, p. 352.

¹²⁷ McConnell, p. 268., and Telephone Interview on 10 Mar 1994 with Capt Doug Moore, MH-53J pilot who flew cover for SF negotiating team.

In effect, we created an opportunity for elements like del Cid's to adopt a version of Alexander George's defensive crisis management strategy referred to as "The Strategy of Buying Time to Explore a Negotiated Settlement."¹²⁸ This inadvertent bit of genius, allowed these elements time to fully absorb their apparent untenable situation. While simultaneously, they were receiving radio reports ala "Radio Nacional" courtesy of U.S. psychological operators onboard Volant Solo, an EC-130, informing them of the devastation of the comandancia. Similarly, television feeds of Armed Forces Network and CNN were provided. This time period, really only a day and a half, gave them a chance to cool down and, in combination with the next measures to be undertaken, time to think about a face saving way to develop a mutually acceptable negotiated settlement.

a. Ma Bell Diplomacy

By Thursday, the twenty-first, Del Cid was having second thoughts about fighting from the jungle with his motley crew of renegades.¹²⁹ He contacted some Catholic priests in his area and through them arranged to talk to Gen. Marc Cisneros, the Spanish-speaking commander of USARSO, the Army Force component in SOUTHCOM, who was acting as Gen. Stiner's deputy. At the same time, Cisneros had been busy on the phone to all the other military zone headquarters working on establishing his "Ma Bell Diplomacy" campaign.

Enlisting the help of a captured PDF soldier, Captain Amadis Jimenez,¹³⁰ Cisneros spread the word that the PDF leadership had no choice but to surrender peacefully. He knew it wasn't true, but it was a persuasive approach. "The combat plan was to attack,"

¹²⁸ Alexander L. George, *Avoiding War: Problems of Crisis Management* (Boulder, CO: Westview Press, 1991), p. 392.

¹²⁹ Flanagan, p. 218.

¹³⁰ Jimenez is an interesting story himself. He was the captured commander of the PDF naval infantry company at Coco Solo. As a professional military officer who married into a wealthy family, he had ties to both the PDF and the same stratum of society that produced the newly elected Panamanian leaders. "I was considered one of the rabiblancos [white tails]," he said. Donnelly, p. 351-352. After surrendering to U.S. forces after the tense battle at Coco Solo, he was quickly recruited by Cisneros for his team to gather intel on Noriega. Donnelly, p. 111.

Cisneros says, "to go in there and fire into the garrisons, and then give them an ultimatum to surrender." Sensing the PDF was not eager to fight, he told his battalion commanders, "See if you can call them first."¹³¹

Cisneros knew that the PDF would need a way to save face. Presenting surrender as a favor to their country was a way to preserve their pride. He also was aware that many in the PDF, having seen their livelihood destroyed, wanted to secure positions in the new government. The "rotten" carrot and the stick approach worked. The choice was prefaced by Jimenez getting on the phone with his former PDF colleagues and establishing a rapport, then Cisneros would put it bluntly, saying to the PDF commanders that they stood a good chance of being included in the new government. The alternative was bloodshed, destruction, and sure defeat.

Although there were elements of a bluff to this strategy, the unique forces assembled possessed the capability to inflict great damage on their positions and they knew it. With our framing attacks on D-day, we had demonstrated firepower, *environmental degradation* and *concentration* that they could not hope to counter. Manipulating the shared risk of a protracted guerrilla war made for a pretty distasteful game of "Schelling" chess for the PDF, their share of the "disaster" being much greater than ours if the game of brinkmanship ended with an accidental war.¹³² Also, we had attained *information dominance* over the fractionated remains of these PDF forces. And we had the luxury of *tempo control* to dictate action. This may help explain, the success of "Ma Bell Diplomacy" when using a big stick that you have already proven willing to swing while only offering a pretty wilted carrot.

Back to the specific dilemma facing del Cid, during several telephone conversations, Cisneros outlined his demands: del Cid had to muster not only the PDF, but also the disarmed provincial Dignity Battalion for surrender. And he had to display a large,

¹³¹ Donnelly, p. 351.

¹³² Thomas C. Schelling, *Arms and Influence*(New Haven, CT: Yale University Press, 1966) p. 99.

white flag from the PDF's *Davíd cuartel*. As a tangible symbol of American Power, Cisneros coordinated a AC-130 Spectre gunship to overfly the *Davíd* headquarters as they were speaking. The signal could not have been clearer: surrender or die. Del Cid surrendered. The crisis situation was settling back a notch into a compellence mode. The U.S. had to conclude the agreement by going to *Davíd*.

b. Setup For Accepting the Surrender

Maj. Gilberto (Gil) Pérez was the Spanish-speaking commander of A Co., 1st Batt., 7th Special Forces Group. He was steeped in the history of Panama.¹³³ He received the warning order on 22 December to start policing up the outlying western districts. He was highly successful at pacifying the *cuartels* in the west using his own brand of mini "Ma Bell Diplomacy" as a two-phased concept.

In phase one, he would land at an airport in the city near the *cuartel* in play, with a AC-130 Spectre gunship on call and a quick reaction force (QRF) of either Lt. Col. Joe Hunt's 3rd Batt, 75th Rangers or elements of Col. Burney's 2d Brig, 7th LID standing by in helicopters. Once he and his team were in place, he would call the commander of the local *cuartel* and ask him to meet him at the local airfield. When he appeared, Pérez would then tell him that he had an infantry or Ranger battalion standing by and that he wanted the commander to surrender his *Cuartel*.

There were three terms to the surrender: First, the surrender would be unconditional; second, all weapons would be placed in the *cuartel's* guard room; and third, all of the PDF in the *cuartel* would assemble on the *cuartel's* parade ground. Then Major Pérez would "invite" the commander to fly with him over the parade ground to ensure that all of the terms had been met. If Pérez detected any hesitancy or reluctance by the commander to comply, he would have the AC-130 register a few rounds of 105mm into an open area of the *cuartel*. This threat and any actual usage were a decidedly non-lethal application for a precise and lethal weapon like this. (The risk would be the effect of a stray

¹³³ Flanagan, p. 215. Accuracy of data confirmed by 16 Mar 94 conversation with Capt Walter Pjetraj, who served with Gil. Currently Gil is working in a foreign affairs posting on the White House staff.

or short round.) Pérez felt that it was essential to use all available means to gain a peaceful surrender with minimum casualties on either side.

In phase two, Pérez and some of his men would move into the *cuartel* to search the area and to process the PDF soldiers. At the same time, a backup 7th ID or Ranger Company would move into the town to establish law and order. The company's mission would be to prevent looting and reprisals that the citizens might be inclined to take against the surrendering PDF, whose past transgressions might have warranted considerable desire for revenge and retribution. Finally a small Spanish-speaking contingent would be left behind to assist with the local community.

His work was extremely successful at three smaller *cuartel's* in Santiago, Chitré, and Las Tablas with only minor incidents and no injuries. This did not escape the notice of the JSOTF as it planned for the bloodless coup de grace to eliminate del Cid's force at David.¹³⁴ It was modeled on his operation, but on a grander scale.

c. The Raid(?) on David

Because del Cid was waffling and acting recalcitrant after his initial agreement to surrender, the planners for the mission felt that there was a real possibility that he might not surrender. Therefore, the composition of the forces for accepting the surrender of del Cid were beefed up as follows: A first task force was loaded on three helicopters, an MH-53J Pave Low and two MH-60G, Pave Hawks. The Hawks were to transport a surrender team party comprised of PDF liaison, Special Forces personnel, key decision makers, and a commo cell with secure radios and a satcom set. The 53 carried a 25 man Ranger package to provide an aerial, roving, blocking party in case of a hostile approach on the surrender party. A second task force with the muscle to support the first and to seize the airfield and secure it for immediate follow on landing by C-130s with additional personnel was inbound two hours behind the first. This timing was used to compensate for the delay

¹³⁴ Telephone interview on 16 March 1994 with Maj Jay Cook, USAF, planner for the AFSOC cell which coordinated this complex mission during Just Cause. Now, he is an instructor at the USAF Academy - doing some interesting research on non-lethal weapons and SOF applications - due out in the summer.

expected for negotiations with del Cid at the schoolhouse and extra trip to the *cuartel* for the first task force before it would arrive back at the airfield. This second task force was comprised of approximately eight heavy-lift SOF helicopters, a mixture of MH-53s and MH-47s, carrying 250 Rangers (Lt Col Joe Hunt's 3/75) plus two AH-64 Apache gunships, four AH-6 Little birds and an AC-130 for topcover. The interesting part of this second package is that the AH-64s and the AH-6s did not have the range (approx. 300 nm) or the aerial refueling capability to fly to David non-stop. So what happened was that the FARP MH-47 Chinooks had to leapfrog out ahead of the package and setup FARPs to refuel those aircraft. It was quite a gaggle.

The first package had a schoolhouse with a telephone as its initial objective. It was about 20 nm southeast of David near the river. The idea was to call del Cid and make the demands for surrender known to him and then have him drive out to the schoolhouse in a single car (maximum of five people in car) so that the overhead MH-53 could interdict any trailers by a chokepoint on the bridge if they followed del Cid. The mission went smooth up to the point where the surrender team was deplaned at the site. Del Cid drove out, but would not get on the helicopter as planned for the ride to the *cuartel*. In retrospect, the one condition he was initially allowed was a promise to not be made a POW. He probably felt that there was a good chance that we might just grab him and fly back to Howard AFB.

Instead of flying to the *cuartel* as planned, he took two members of the surrender team with him in his car and drove back to the *cuartel*. Now, things were getting riskier as the two MH-60s took off for the *cuartel* to meet him. No longer was the PDF commander onboard to insure a deterrent to an ambush on approach into the *cuartel*. However, no aggressive action was taken by the PDF while the 60s landed.

Del Cid's next demand was that he surrender only to a General officer. Cisneros was called and one was put on one of the C-130s waiting to takeoff from Howard. At about H - 30 minutes from when the seizure package was to arrive, the surrender package flew over to the airfield to meet the C-130 with the general that was inbound. At this time the helicopter crews noticed the crater in the runway at David. This would preclude the

arrival of the C-130s until filled in. Additionally the anti-aircraft artillery (AAA), ZPU-4s, that were supposed to be unloaded and depressed were loaded and pointing skyward, aircraft that were supposed to be tied down were not, and the weapons that were supposed to be piled on the airfield were not in place.

Unbelievably, things were fairly calm at the airfield, even with all the irregularities. The Rangers were off loaded from the MH-53J and the local fire company was enroute to the airfield to fill in and patch the hole in the runway. Things got exciting when the MH-53J crew remembered that all these deviations in the plan put them at ground zero for the rapidly approaching airfield seizure package. At that point, about H - 5 minutes, they got out a call on the Satcom warning the second task force that there were friendlies on the field.

The seizure force landed and secured the perimeter without incident. Shortly after, the runway was patched and the C-130 carrying the general arrived. At H + 1 hour del Cid Departed as other C-130s were landing to deplane the reserve forces for searching the city for arms caches and for providing law and order in David. As del Cid was enroute to Howard he was flex cuffed. Landing at Howard he was introduced to two DEA agents with extradition paperwork for his drug indictment in the U.S. They read him his rights and boarded a jet for Miami with him after a little photo session on the ramp. He was never a POW,¹³⁵ although later he may have wished that he had the rights and privileges of a POW, instead of a convicted felon.

3. Final Analysis

First, as already mentioned, it appears that by allowing time for the fragmented forces to consider their situation, clearer heads were allowed to prevail. The "Ma Bell Diplomacy" and "Mini Ma Bell Diplomacy" campaigns worked because of the *tempo control* that the U.S. forces possessed and the almost indiscriminate ability to appear anytime and anyplace in Panama and concentrate without the dispersed forces of the enemy knowing our exact

¹³⁵ Telephone Interviews, Capt Doug Moore, 10 Mar 1994, and Maj Jay Cook, 16 Mar 1994.

disposition because we had absolute air superiority and could operate at night (environmental degradation). With our ability to concentrate unexpectedly and by using our expanded understanding of the objective, we could *shoot, move, communicate, know, and react* at all levels of combat to pursue our ends. The framing events that changed the status quo at the onset of the invasion and after the success of the initial overwhelming battles had a shocking psychological impact on the psyche of the PDF. As such, the morale elements that would reinforce any type of guerrilla resistance effort were lacking.¹³⁶

This was a big stick, and in the words of George, the U.S. used it as blackmail at times, "It consists essentially of demanding the adversary give up something on pain of suffering serious punishment or damage if he refuses to do so."¹³⁷ Unlike in relations at the state actor level, use of this offensive crisis management strategy proved extremely successful when dealing with sub-state actors that had bought into the belief that you were nasty enough to annihilate them if they did not comply.

Additionally, in the explanation for the concept of the Mini Ma Bell Diplomacy, coercive diplomacy is displayed. If the PDF commanders did not comply, the directed shots from the AC-130 Spectre into the open area of the *cuartel* would qualify as an "... exemplary use of quite limited force to persuade him to back down."¹³⁸ Having someone register 105mm howitzer rounds in your backyard can surely get your attention without necessarily hurting anyone. Although this use of lethal firepower in non-lethal demonstrations was not without risk, a stray or short round could have caused many casualties. "Gunship Diplomacy" of this sort actually was used quite extensively, and in all probability greatly reduced casualties on both sides. Seeing that gunship orbiting at 6000 ft AGL had an

¹³⁶ "Chiriquí province . . . was the natural place for Noriega to retreat to lead his own resistance movement. But del Cid and his officer corps decided within twenty-four hours that Mr. Noriega was no latter day Che Guevara." Frederick Kempe, *Divorcing the Dictator: America's Bungled Affair With Noriega* (New York: G. P. Putnam's Sons, 1990), p. 18.

¹³⁷ George, p. 379.

¹³⁸ Ibid., p. 384.

amazing calmative effect on potential combatants.¹³⁹ Similarly, the use of armed helicopters in a like roles produced similar effects. One of the biggest risks inherent in conducting bold operations like this was the lack of security for these small teams as they daringly flew into enemy garrisons in the daylight. This suggests that enhanced self-defense measures utilizing NLWs may be necessary so that this act may be committed with a safety net, if our understanding of enemy intent is not as accurate and fine-grained as we suspect. Some NLW types may help support both the demonstration needs of these type "Military Diplomacy" missions, as well as the security needs of the forces tasked to execute them. We will analyze these NLWs in the matrices in Chapter V.

D. POLICING PANAMA CITY

1. Establishing the Framework for Urban Operations After D-day

Operation JUST CAUSE was a campaign that consisted of two ambitious operations. The goals of the first were to protect American citizens and installations, to secure other key sites within Panama, to capture and deliver Noriega into competent legal hands, and most importantly, to shatter the PDF. The second operation, which was to begin almost simultaneously with the first, was to replace Noriega's rule with the democratically elected government of Guillermo Endara and to rebuild the PDF as a police force. As General Stiner later told redeploying troops, who had just jumped into Sicily Drop Zone at Fort Bragg, "The mission in Panama was a difficult one. We were literally to decapitate a government and then shake hands with the same people who we fought the night before and say, 'We want to help you now.'"¹⁴⁰

The first of these operations went remarkably well. The assault on dozens of targets simultaneously, in the middle of the night, and with overwhelming force, left Noriega and his supporters little hope of response. Stiner's insight that the PDF was a highly centralized organization, capable of only modest action without direction from Noriega or his chief

¹³⁹ Telephone interview, Clay McCutcheon, AFSOC historian, 7 Mar 94, Hurlburt Field, FL.

¹⁴⁰ Flanagan, p. 232.

lieutenants, proved to be true, and was vital to the success of the assaults on D-day. Stiner's analysis of the role of the PDF in Panamanian society meshed neatly with the intention to use swift, overpowering force to accomplish the Bush administration's goals in Panama. However, when the sun came up on the morning of the twentieth of December, the frictions of war and some oversights in the planning stage of the integrated operations to collapse the power of the PDF and the Dignity Battalions (Digbats) were already starting to cause problems in the urban areas of Panama City and Colón.

This mini-case study examines incidents in Panama City in the week following the invasion. Using the paradigm of control warfare and a careful review of the literature on JUST CAUSE, we will examine possible causes, besides a lack of military presence and law enforcement, that contributed to the wide extent of the looting, sniping, and drive by shootings. Specific incidents to be reviewed include the looting of the shopping districts, the snipers effectiveness in pinning down U.S. forces, the attack on the U.S. Embassy, and the incidents at the Marriott. This approach is combined with interview data and personal observations to create a slightly revisionist view of this situation so that the lessons learned may be applied to the analysis in Chapter V of what specific NLWs and non-lethal tools may have aided the conduct of operations in these urban areas. This type analysis will hopefully shed light on key moral and physical elements to concentrate on in future operations in similar environments.

2. Dealing With Urban Unrest

The conventional view for what went wrong with the campaign in the city focuses on the frictions of war and the late deployment of the 82d Airborne and the 7th LID. Due to a freak ice storm at Pope AFB, in North Carolina and stubborn fog at Travis AFB, in California, both units arrived too late to fulfill their missions as originally conceived.¹⁴¹ According to LTC Jerry Murguia, who was the chief of Thurman's Current Operations A team, the OPLAN depended on the 2nd Brigade of the 7th LID, who has been rigorously

¹⁴¹ McConnell, p. 228. Flanagan, pp. 61, 197-198.

trained in MOUT, to spread out through the wide metropolitan area to establish roadblocks and secure key government facilities and infrastructure, such as power plants and water works.¹⁴² In fact, by the time the 5/21st of the 2nd Brigade arrived, 1515 hours on D-day, they assisted with the securing of Tocumen and then were reassigned by Gen Stiner on the twenty-first to a western AO.¹⁴³ In any case there was not an early presence in Panama City in the early morning before daylight on D-day to "nip in the bud" the ensuing Digbat and dispersed PDF sniping, drive by shootings, hostage taking, and other attacks.

Murguia noted that the will to fight and the cohesiveness of the PDF had been effectively crushed after H-hour. But he also realized that the opportunity to quickly deploy the overwhelming force needed to completely subdue the PDF and the Digbats and to pacify the city had been missed. Others point out that the priority of the other military targets and the necessity to wrap up the PDF had precedence over the civil unrest problems in the city. Regardless, it seems that the looting that stripped clean the downtown commercial districts reflected the biggest failure of the operation.

The strategic objective of securing a democratic government was adversely effected by the losses due the comprehensive looting of the whole area. Loss estimates from \$500M to \$1.0B¹⁴⁴ and the rebuilding time for this infrastructure both impacted the ability of the new government to get off to a robust start. Also the international informational aspects of this highly visible problem gave this otherwise exemplary operation a black eye through the reporting of the media. Scenes of unchecked looting and the perceived anarchy of sniper attacks - as broadcast around the world by CNN - were distorting the truly remarkable success that had been achieved at H-hour. Were the facts that the 7th LID or other U.S. forces were not swarming over the city or that the collapse of policing efforts with the quick demise of the PDF the only causes for this quick devolution into a free for all, or was there

¹⁴² Ibid., p. 228.

¹⁴³ Flanagan, p. 198.

¹⁴⁴ Kempe, p. 17., Quotes estimate of \$500M. In Flanagan, p. 210, a Panamanian Chamber of Commerce estimate by Alfredo Maduro topped out at one billion dollars.

some other catalyst. The following discussion examines through the lens of control warfare some of the possible contributing factors that were overlooked in a more conventional analysis.

a. The Roots of the Urban Jacquerie

Besides the lack of presence operations by the U.S. in Panama City early on after H-hour, some other key catalysts appear responsible for accelerating the lawlessness and looting in the some of the richest shopping districts in Latin America. At 0104 hours on 20 December, Captain Ivan Castillo, Noriega's personal bodyguard, was awakened from a doze outside of the aging La Siesta Hotel which had been transformed into the Centro Recreativo Militar, or called the Ceremi guest house by Noriega. Inside was Gen Noriega with Gloria, a girlfriend. What woke him was the nearby sounds of several loud explosions and the rattling sounds of automatic weapons to the west at the Tocumen-Torrijos airport complex. He looked up to see the terrible sight of hundreds of Rangers streaming from transports. This was the invasion that Noriega had refused to believe would ever happen. Castillo quickly took control of the situation.

He hustled Noriega and the girl into a white Hyundai and they made their escape. He quickly realized that Noriega had no rational plan whatsoever. Instead Noriega was incoherently stammering about some forgotten Santeria charms and drunkenly mumbled, "What are we going to do?"¹⁴⁵ After fleeing from one house to another and repeated phone calls to and among his small circle of close supporters, the situation looked bleak. Noriega talked on the phone with Capt. Asuncion Gaitan, who commanded his personal escort and served as Panamanian liaison with the various Cuban military and intelligence programs.¹⁴⁶ Gaitan persuaded Noriega to make a defiant speech into the phone, which he recorded at the other end. This speech was to prove an effective psychological weapon for the dictator who

¹⁴⁵ McConnell, p. 105.

¹⁴⁶ Kevin Buckley, *Panama: The Whole Story* (New York: Simon & Schuster, 1991), pp. 195-6.

was in reality on the run for his life and only really searching for a place to hide. Highlights of the translated transcript follow:

We're in trench warfare now. . . and we will maintain the resistance, . . . We must resist and advance . . . We ask the world for help, with men, dignity, and strength . . . Our slogan is to win or die, not one step backward.¹⁴⁷

With his initial escape and with the phone system in operation, his mini-victory started a chain of events, when combined with the lack of presence of U.S. troops downtown and the collapse of the National police because they were part of the PDF. With Noriega on the loose, and because Noriega's power structure was based on greed, the U.S. quickly put up a bounty of one million dollars for help in his capture.¹⁴⁸ The hope was that a PDF trooper or member of the opposition would finger him. This tactic plus the active search measures ongoing to track him down greatly restricted his ability to maneuver.

b. Looting in Panama City and Colón

However, the taped message Noriega made was soon being transmitted on Radio Nacional, which had been taken over by the PDF. This message had a very inflammatory effect on the morale of the remnants of the PDF and the Digbats in the urban areas. Early in the morning of the twentieth, elements of PDF and Digbats were soon leading efforts to break into stores, removing the money from cash registers, and piling the most valuable goods on trucks. Then, they would stand guard while looters picked clean what remained on the shelves. By mid-afternoon the streets were jammed around Avenida Central and Via España with looters in a frenzy of lawlessness. The looting continued unabated for thirty hours.¹⁴⁹ The Digbats that struck out on their own as snipers also persisted far longer than expected. This also may have been one more consequence of the mixed information

¹⁴⁷ Ibid., p. 238.

¹⁴⁸ Flanagan, p. 220., Kempe, p. 17.

¹⁴⁹ McConnell, p. 232, and personal observations from the cockpit of an MH-60G helicopter. For extensive photos see David S. Behar and Godfrey Harris, *Invasion: The American Destruction of the Noriega Regime in Panama* (Los Angeles, CA: The Americas Group, 1990), pp. 55-72.

that the radio message and the continued transmissions of Radio Nacional fostered.¹⁵⁰ Even with the decisive D-day victories, this loss of information dominance caused an unclear sense among the remnants of the PDF, the Digbats, the poor population in the urban areas, and the media that the war was really over and that there was any semblance of order being imposed by the U.S. forces.

The rules of engagement for dealing with the looters restricted the American forces from firing on them if they were unarmed. The complication to this situation was the fact that mixed in with the looters were the armed Digbat members. With the statement on Radio Nacional that they would kill any yankee on sight, there was considerable risk of sniping or skirmishes for any small patrol that waded into any of these looting situations. As the looting escalated in the Colón duty-free port, the Americans were authorized to fire warning shots, then to fire near the looters, and finally, to shoot to wound. Without a riot control ability in Panama City or Colón, these measures came up short of stopping the looting until it had run its course. However, in Colón, one anecdotal example of a way the looting supported by armed Digbat was curtailed follows:

... the effective strength -- and definitely the morale -- of these "troops" was cut by the Navy SEAL sniper team set up on the roof of a port building at the south end of the bottleneck. The SEALs had a spotting scope, as well as an M-24 7.62mm sniper rifle. They also had one of the new .50-caliber long-range sniper weapons, which was in effect a single-shot version of the devastating .50-caliber machine gun. This weapon was precise out to a thousand yards. The SEALs spotted a group of civilians armed with assault rifles and festooned with ammunition pouches and rocket grenades. Technically, these "armed civilians" fell under the shoot-to-wound category. But it was impossible to merely wound with a .50-caliber sniper rifle. When three of the four Digbats were struck squarely in the torso and killed, falling one after the other like shooting gallery targets, the scale and tempo of the looting quickly dropped.¹⁵¹

¹⁵⁰ Juan Vasquez, "Panama: Live From the Marriott!" *Washington Journalism Review*, March 1990, p. 46. Some of the most inflammatory messages being spread by the PDF announcer on the radio proclaimed that the Digbats guiding principle would be "*Yanqui Visto, Yanqui Muerto!*" (Yankee Seen, Yankee Dead!).

¹⁵¹ First Lieutenant Clarence E. Briggs III, *Operation Just Cause* (Harrisburg, PA: Stackpole Books, 1990), p. 79.

c. Sniping and Counter Sniping Operations

The sniping in Panama City by the Digbats slowed the ability of U.S. forces to fan out from their positions to patrol and to recover control of the city after it had been lost. On the night of the twenty-second, Pvt. James Allen Tabor, a .50-caliber machine gunner with the 4th Batt., 325th Parachute Infantry Regiment, became a fatal victim of a sniper. As his patrol started out the gate of Paitilla towards the main part of Panama City, it came under immediate sniper fire.¹⁵² Similar incidents impacted the ability of other patrols to move out and provide presence in most of Panama City.

Some concerned citizens built barricades in the streets around their neighborhoods and provided for their own security by manning them with shotguns and hunting rifles. After a couple of days, the situation gradually returned to some sort of normalcy as U.S. soldiers spread out through the city and patrolled the streets. Eventually, over 1100 Military Police were assigned to Col. Larry Brede, the commanding officer of Fort Bragg's 16th Military Police Brigade. The MPs from the various units under Col. Brede's command performed many more duties than just trying to control traffic and prevent looting. They enforced basic laws and operated "detainee" camps for looters, former prisoners, and PDF members.¹⁵³

The effectiveness of the snipers was reduced by some different types of counter-sniper operations. In Colón, the anecdotal example referenced above towards looting was one example. In Panama City, the use of small armored task forces like Major Donovan's "Panzer Gruppe"¹⁵⁴ were able to move special forces troops to trouble spots around the city. On the twentieth, helicopters gunships were also tasked to engage snipers in highrises in the Chorrillo area to assist the troops fighting for control of the Comandancia. Additionally, in the next couple of days, later calls for support from some engaged units were answered by special operations helicopters that provided counter-sniper fire.

¹⁵² Flanagan, p. 208.

¹⁵³ Ibid., p. 210.

¹⁵⁴ See note 117 on page 63 for an earlier reference to this unique package.

d. The U.S. Embassy Under Attack

The following anecdote relays the vulnerability of the U.S. Embassy shortly after the invasion, before it was reinforced with special forces soldiers. A few hours after the fighting began, a squad of uniformed PDF soldiers in full battle gear roared down Avenida Balboa in a pickup truck and a Land Cruiser and stopped under the palm trees near the Embassy. Using the concrete barrier of the seawall as a shield, they proceeded to blast the Embassy chancery with rocket-propelled grenades.¹⁵⁵ The RPGs smashed through the chancery's outer wall and exploded near the ambassador's office on the third floor. Inside, the Marine guards returned the fire as best they could with M-16s and shotguns. But the Embassy guard was badly outgunned. Had the PDF elected to exploit their fire-power advantage, they could have blasted their way into the Embassy and slaughtered the guards and foreign service personnel or taken them hostage. Instead, the PDF soldiers knocked out a few more windows with their AK-47s and drove off into the night.¹⁵⁶

This incident outlines the necessity for some way to repel attackers in an emergency. Point defenses for embassies can be easily overwhelmed by a military-type attack. The constraint on the embassy is that it is not an armed fortress. The use of pre-positioned non-lethal defenses, to provide limited stand off or a temporary "moat" around the facility until help arrives seems like a reasonable contingency defense idea.

e. Incidents At The Marriott Caesar Park Hotel

Another target for disjointed PDF vengeance was the Marriott Hotel beside the modern Atlapa Convention Center in a middle-class neighborhood in the San Francisco district on the bayfront 2 miles east of Paitilla Point. The Marriott was a status symbol for the prosperous rabiblanco community, a gathering place for gringos, and the headquarters for American news media, so it was not a surprise that it was raided twice by Digbat gunmen. Shortly after H-hour the first incursion by Digbats resulted in the hostage taking of some

¹⁵⁵ See David S. Behar and Godfrey Harris (1990), p. 130.

¹⁵⁶ McConnell, p. 194.

media personnel and/or their wives.¹⁵⁷ However, they were released within a few hours and allowed to return to the hotel.

Around 0900 a second wave of Digbat gunmen burst into the Marriott lobby and seized CBS producer Jon Meyersohn, ABC producer Robert Campos, and an American resident manager for the Marriott, Daniel Sarria. Two were released that afternoon. Meyersohn together with a GTE Corporation executive, Doug Mullen, were among the last Americans to be released by the Digbats three days later.¹⁵⁸ Around 2300 on the 20th, B Co/2d Batt /504 Inf. (Airborne) finally reached the hotel after a grueling 2½ mile road march marked by numerous sniper attacks and a shootout with Digbats in a truck. They blasted their way into the unlocked hotel and proceeded to round up all the "hostages" that had been reported to their headquarters. The last confusing incident at the Marriott involved the arrival of the relief convoy to transport the hotel guests to Panama Viejo.

At 1000 on the 21 December, the evacuation force, led by Capt. Greg Sawyer and consisting of four .50-caliber mounted HMMWVs, one Sheridan tank, two cargo trucks from 1st brigade, and two large civilian "Marriott" airport catering trucks, arrived on the scene. According to several sources, it appeared that the evacuation force and the 2/504 soldiers were involved in a friendly fire incident with each other as the convoy approached the hotel.¹⁵⁹ Other reports by the U.S. government officially denied this, but there was a law suit filed against the U.S. government by the family of a Spanish photographer, Juan Rodriguez.¹⁶⁰ The guests were transferred safely out of the area. Although some returned within twenty-four hours to continue their coverage of the war.

¹⁵⁷ Ibid., pp. 194-5.

¹⁵⁸ Donnelly, p. 232.

¹⁵⁹ Patrick Chauvel, "Too close to Combat," *Soldier of Fortune*, May 1990, pp. 62-76.

¹⁶⁰ See Alan Riding, "U.S. Sued in Death of a Journalist in Panama," *New York Times*, June 24, 1990, p. A15. The U.S. later settled out of court with the family.

3. The Aftermath

By late in the day on the twentieth, the offices of Radio Nacional, that had been taken over by the PDF, were finally assaulted by a heliborne force. The highrise offices in Punta Paitilla were swept of PDF and the transmitter destroyed.¹⁶¹ The question remains why was this overlooked for almost twenty-four hours when the Channel 2 television station was surgically removed from the air shortly before H-hour in anticipation of the informational aspects of the war.¹⁶² Similarly, Noriega's communication ability by the use of the telephone system seems like something that needs to be accounted for in any future *coup de main* as part of a PCO. In the "softer" battle for information dominance over the morale aspects of the minds of the public and the will of the dispersed enemy, being on the air and clearly explaining the situation may preclude strong resistance or lawlessness.

Physical security of some key U.S. facilities besides the bases also needs to be addressed. Most notably would be the vulnerability of the Embassy to attack, but also, the security of main tourist hotels and the risk of a mass hostage situation they represent needs to be taken into account. Some of the criticisms by knowledgeable people on the ground in Panama City, include the problem of the neglect of planning for public safety in the plan for defeat. They feel that anarchy in major urban areas will undercut policy in "special wars" and the story will be lost in the confusion.¹⁶³ Also, pointed out is the effect that these incidents have on the portrayal of the operation to domestic audiences and for domestic politics. This type of civil disorder is one of the first indicators of failure. Thus, the policy process is immediately effected by this perception and national strategic input down channel

¹⁶¹ McConnell, p. 233.

¹⁶² Ibid., pp. 113-4, A brief description of this innovative raid composed of operators and technicians illustrated the smart way to non-destructively shutdown a station with the option of bringing it back up quickly for your own purposes. TV Channel 4 was also not secured until after the invasion, but this may have had something to do with the fact that the owners, the powerful Eleta family, were not Noriega sympathizers, Buckley, p. 175.

¹⁶³ Interview with John W. Rendon, Jr. on 26 Oct 1994. He was under contract with the Endara government for international public relations assistance. Flown in by U.S. transport shortly after the invasion, he went through a couple swarming incidents in the following days where crowds of looters passed by his vehicle.

causes mission creep at the operational and tactical levels. This may actually lead to failure as the goals of a mission are re-prioritized on the fly without consideration to the NEVs that were originally targeted.

Overall, the U.S. was lucky that there were only three U.S. civilian casualties, with the potential for loss that was reviewed in this case study. It is understood that in a city of 1.2 million, U.S. troops engaged in a shooting war simply could not protect every U.S. citizen. Similarly, shielding all the businesses and stores from looting also presented a daunting task. However, as this brief study indicates some low cost measures coupled with a better management of information, could have been incorporated into the plan to do a better job than was accomplished. Gen. Thurman explained the prioritization in the following quote:

Not to downplay anyone's loss. . . [, but] we had to make a choice given the manpower we had. We made a choice to protect high value targets: the utilities, the television facilities, power, water pumping, food warehouses, and telecommunications, not the local 7-Eleven.¹⁶⁴

Not to disagree with General that we did a fine job in Panama, but it appears as though we missed a couple of the key items on his list. Based on this case study, telecommunications and food warehouses stick out as two glaring examples.

Additionally, an appreciation of the extremely high value of every American life in these type "special wars" should have led to some pre-positioned support at the Embassy and at the major hotels like the Marriott and the Holiday Inn in Panama City. A priori clandestine insertion of squad-sized special forces elements in mufti with a minimum of heavy weapons or non-lethal weapons to hold back the "bad guys" may be the most prudent course in future situations that approximate the scale of JUST CAUSE. As a close associate of Endara's, Anel Beliz stated, "The U.S. was very, very lucky, they didn't get protection to their people."¹⁶⁵ Indeed, the failure of U.S. troops to protect civilians outside of military garrisons at H-hour tarnished the triumph of the invasion. It just so happened that the scale

¹⁶⁴ Donnelly, p. 235.

¹⁶⁵ Ibid., p. 234.

of the urban looting and civilian casualties among Panamanians in the neighborhoods surrounding the Commandancia were so much higher than the American losses that the question of minimum force and collateral damage to the indigenous population and the Panamanian infrastructure became a much greater issues in this case. The question of the number of Panamanian civilians killed caused much controversy and led to many follow on investigations, not least of which was a congressional investigation.¹⁶⁶ It should be expected that any future foe will take better advantage of any opening for causing pain and suffering to Americans than was the case in Panama.

E. COMPARATIVE LOOK AT MINI-CASE STUDIES

In the next chapter, we will run through a detailed review analyzing both the emerging glimpses of control warfare and the potential application of NLWs that seem to apply to the mini-case studies. However, a quick look back at the two mini-case studies reveals some easily observable general trends that will become even more apparent if first capsulized here. In the first case study that examined operations in the west of Panama, Chiriquí province, it appeared that the closer we came to waging control warfare, the more use could be made for non-lethal techniques if not for specific non-lethal weapons. The exemplary and restrained use of such highly lethal weapons such as the AC-130 Gunships and helicopter borne special operations forces in non-lethal compellence roles suggests the expanded role for specifically designed non-lethal weapons and tools. That is if they are designed to replace or augment lethal tools in these missions while still maintaining, if not highlighting, the threat of use for our sharpened stiletto. In this environment, Dr. Deutch's short quote in the beginning of this thesis - pairing NLWs with the development of PGMs - takes on deeper meaning.

¹⁶⁶ For example, see *The Invasion of Panama: How Many Innocent Bystanders Perished*, A Report of the Investigations Subcommittee of the Committee on Armed Services, House of Representatives, 102 Congress, 2nd Session (Washington D.C.: U.S. GPO, July 7, 1992), CBS TV's September 30, 1990 "60 Minutes," and a book prepared by The Independent Commission of Inquiry on the U.S. Invasion of Panama, *The U.S. Invasion of Panama, The Truth Behind operation 'Just Cause'* (Boston, MA: South End Press, 1991).

Where we strayed from control warfare tenets in the mini-cases in the second study was by not addressing and planning for contingencies in the urban areas of Panama City and Colón. As a result, we had to go lethal to regain a foothold and credible coercion. By not being "ahead of the curve" in the realm of information dominance, and losing the initiative of our overwhelming forceful entry, we slipped into an environment of "graduated compellence" where we had to engage a physically and mentally toughened opponent who had recovered his wits. Additionally, the fires that devastated the El Chorillo barrio next to the Commandancia (regardless of who caused them) toughened the opponent. As is often the case in insurgencies, "the dead dictate policy."¹⁶⁷ With fewer dead or displaced, the less the support and reasons for revenge. With this simply stated, but hard to realize advantage for both control warfare and NLWs, we will now review and further analyze the case studies.

¹⁶⁷ Quote borrowed from Dr. Larry Cable's, *Peace Operations* lecture at the NPS, 2 Feb 1995.

V. ANALYSIS

A. THE CHALLENGE

Judging the utility of NLWs in the constrained and changing environment of a PCO is much more difficult than judging that of lethal weapons. In actual operations - at least for lethal weapons - the planners, commanders, and troops have amassed an excellent appreciation for the effectiveness of particular weapon systems. For research and development studies, testing, training, and operational data on previous usage of lethal weapons have allowed the development of combat simulation models to predict the outcomes of fire support missions and individual soldier performance in studies of future scenarios.

For these studies, combat potentials are weighed against the amassed and detailed analytical database drawn from past performance of a weapon to measure its ability and degree to incapacitate in the projected scenario. Additionally, the easy viewing of their physical effects allow a more intuitive understanding. Previous usage of lethal weapons have produced known, measurable, physical effects on the enemy in reaching the goal or desired end state objective of an operation. But, figures of merit like "loss exchange ratios" used by the Army to evaluate conventional combat simulations, do not fit with the policy direction for these emerging PCO, "special wars" or the use of NLWs in which the desire is to avoid casualties.¹⁶⁸ NLW use in this environment, with their physical and morale effects, are difficult to judge, as they not only impact the physical capability of the enemy, but also the morale force or will to fight.

Carried over from our earlier discussion of control warfare, it appears that the concepts that support it and the system it models also address these "softer" more subtle dimensions in warfare. In the following overall analysis of each case study it will be interesting first to evaluate separately the applicability of the control warfare paradigm to

¹⁶⁸ DoD briefing, "DoD Activities in Non-Lethal Weapons," (94-S-4521), cleared for open distribution October 19, 1994. In an ARDEC preliminary analysis by Don Miller (ASCO/ARDEC), "Reducing Casualties in Contingency Theaters: NLW in SO/LIC and Early Entry OPNS," 10 June 1994, the new metrics included the numbers of casualties - both red and blue - and a measure of the probability of mission success.

the mission areas and then second to subsequently address the projected suitability of NLWs to operational tasks within these mission areas. For this second analysis, MOEs will need to be addressed that conform to the constrained tasks that need to be accomplished.

If our conceptual discussion of a new control warfare paradigm does indeed reflect a revolution in warfare, then perhaps the existing measures of effectiveness (MOEs) are not adequate for measuring goals in the new emerging model for operations. Therefore, MOEs will be developed around the defining dimensions of the perceptual shorthand for knowing the potential capabilities and intent of the enemy and our own forces. This perceptual shorthand was discussed in the end of Chapter III. In the conclusion, a comparison of these two parallel analyses will help answer the hypothesis of this thesis as well as lay the conceptual groundwork for further qualitative and quantitative questions and issues.

Reviewing the theoretical discussion in Chapter III, the new paralyzing requirements of control warfare seem to dovetail with the policy constraints of minimum collateral damage, minimum force, and quick decisive defeat. But, modeling intent or the "softer" psychological dimensions of the morale character or will of the enemy seems significantly more difficult than measuring the degree of physical destruction of enemy personnel or matériel. Given the challenge of measurability of effects, military and political suitability, and the newness of these tools, coupled with the external constraints: the legal and ethical, sociopolitical, informational, environmental, and economic considerations on their use, we now will delineate the methodology for our case study analysis.

B. CASE STUDY ANALYSIS

To establish the background on the methodology that we will be using in the case studies to analyze missions with respect to control warfare and NLWs, it may first be useful to consider the linking of strategies to tasks. The "Strategies to Tasks"¹⁶⁹ concept, that we will be using, links U.S. policies and strategies to specific operational tasks performed by the

¹⁶⁹ Lt. Gen. Glenn Kent, USAF, *A Framework for Defense Planning* (Santa Monica, CA: The RAND Corp., June 1989), Technical Report R-3721-AF/OSD, and David E. Thaler, *Strategies to Tasks: A Framework for Linking Means and Ends* (Santa Monica, CA: The RAND Corp, n.d.).

armed forces in the conduct of military missions and sub-missions. This method seems particularly appropriate for evaluating missions within PCOs like JUST CAUSE where the number and complexity of missions and their constraints combine to make it difficult to ensure that the means are appropriate to the ends. Given limited policy objectives and then trying to match the appropriate power or utility of a particular military tool(s) to support each operational task has proven to be very challenging. To sort out and list all the "generic" operational tasks also could be tedious. Luckily, there have been some comprehensive compilations of operational tasks that could be applicable in one or more mission areas.¹⁷⁰ For this analysis, we will only be concerned with examining specific tasks that we evaluate as principally applicable to the completion of missions within the case studies.

In the two case studies, we will look at the national and military objectives governing each significant mission within the context of each phase of the operation. References back to the framing discussion of Operation JUST CAUSE in Chapter IV will be essential. We will reference or define the operational mission and the corresponding strategy to accomplish the objective. We will then examine the operational tasks that these strategies dictate. For the first analysis, the concepts developed earlier in Chapter III that characterize control warfare will be used to review and judge the operational strategy driving these selected tasks for their appropriateness within the conduct of the overall operation. These concepts include the following: information dominance, objective (expanded), concentration, tempo control, and environmental degradation.

In the conclusion, we will look back to compare the results of this analysis, where the strategies driving the operational tasks are evaluated using the perceptual lens of *control warfare*, with the results of the following matrices analysis on the applicability of NLWs to the operational tasks. To answer the primary question posed in this thesis, we are more concerned with comparing the net assessment of the relative projected applicability of NLWs between the first case study and the second and not specifically concerned with comparing

¹⁷⁰ For example briefing notes from a Non-lethal Technologies Study for OASD(SO/LIC) by Jaycor titled, "Sub-task 2 Briefing: Uses of Non-Lethal Technologies," (FOUO), March 30, 1994.

NLWs. As mentioned earlier, this will provide the basis for the evaluation of the hypothesis of this thesis. However, the second part of our analysis that addresses an MOE evaluation of NLWs may be also useful for setting the stage for later more detailed operations research type analysis, examinations, and trade off studies for prioritizing future acquisition, testing, and operational use of NLWs in an environment of severely constrained resources.

Specifically, for the second analysis, as the operational tasks define the courses of action that we would take to defeat courses of action the enemy may take, the "enemy system" part of the familiar METT-T¹⁷¹ acronym is expanded upon by using the following perceptual device. The tasks are evaluated by criteria developed for examining our system and its interaction with the enemy system by categorizing the MOEs under the generic capability headings of *shoot, move, communicate, know, and react* (concepts discussed at the end of Chapter III.). The specific MOEs will be discussed in the next subsection and within the context of the individual case studies. For evaluation, the advantages and characteristics of the NLWs that "deploy" positively into each MOE will be qualitatively reviewed based on the limited quantitative references from a table developed by ARDEC (Appendix B) and from the summarized effects listed for each type of NLW in Appendix A. These different types of NLWs will be cross-listed within the target or general task categories defined in Chapter II. Only then will they be "deployed" into the MOEs in the weighted comparison type matrices in Appendix C which are described below.¹⁷²

This technique will allow us to judge their applicability to the particular operational tasks associated with a mission. In the lower half of these matrices, the relative merit of the particular "deployed" NLWs will be filtered by the combined effects of the external constraints listed above to weight their net utility. These external constraints, especially the

¹⁷¹ FM 100-5, p. 2-4. Mission, enemy, troops, terrain (and weather), and time available - is the analytical framework that commanders use to designate physical objectives such as an enemy force, decisive or dominating terrain, a juncture of lines of communication (LOCs), or other vital areas essential to accomplishing the mission.

¹⁷² Because the number of columns in this matrix is large, for presentability, the matrices for each case study will be divided into sub-matrices on separate pages by the categories as follows: personnel, matériel, information, and security.

legal issues, will first be examined in detail to establish the supporting references and audit trail for their relative correlation to specific NLWs. Even though costs are extremely important in prioritizing development of NLWs, it appears as though the costs of these systems are not high and the relative differences in cost are not significant to exclude any NLWs from this initial evaluation effort. In later, more detailed quantitative analyses or trade off studies, costs will definitely need to be factored into the equation against effectiveness as we continue to operate in an environment of fiscal constraints.

The format for these matrices will be in accordance with that used in Quality Function Deployment (QFD) matrices as used in Total Quality Management/Leadership (TQM/L) team applications for development of a product, service, process, or strategy.¹⁷³ The acquisition and evaluation of new defense systems, by both DoD and NATO are starting to be viewed by the use of such tools.¹⁷⁴ This weighted matrices evaluation format was chosen because it offers an accepted standard for weighted heuristic analysis of multi-attribute decision problems that are nearly impossible to evaluate algorithmically because of the limited data for all the variables.¹⁷⁵ Even though this effort represents the views of only one person, the technique is designed for use by a cross-functional team that fully understands the end users requirements and also includes the customer or end user on the team. This multifunctional approach encourages synergism to identify and resolve strategy

¹⁷³ *QFD/CAPTURE Guide*, p. 5. A data management and documentation program used to display matrices built for the analysis in this thesis, developed by International TechneGroup Inc. (ITI), Milford, OH. An interview on 26 October 1994 with Mr. Richard Rhinesmith, at the Advanced Systems Concept Office, ARDEC revealed that he used QFD techniques as part of his study entitled, "An Examination of Future Munitions Requirements For The Army Using QFD Techniques," in November 1991. Later, he used iterative QFD matrices to evaluate reduced lethality weapons as they deployed directly into tasks.

¹⁷⁴ References include the prioritization of requirements for the A/F-X, NATO AGARD Study 37 (Options and Implications for Increasing Mobility by Reducing Dependency of NATO Combat Aircraft on Specialized Infrastructure and Support), SSST, and ASTOVL programs. Examples listed in training guide for a two day short course for DoD personnel participating in new joint wargames at the Joint Warfare Center. Training given on 13-14 April 1994 by Susanne Bergman, Dave Hamilton, and Eric Zust, from the Weapon Systems Requirements/Effectiveness (WSR/E) organization within the New Aircraft and Missile Products (NAMP) division of McDonnell Douglas Aerospace (MDA).

¹⁷⁵ Major Michael D. Armour, Tennessee Army National Guard, "Decision-Making Processes," *Military Review*, April 1994, p. 71.

to task (and technology) issues up front. By adopting this type of decision aiding approach and combining its use with traditional trade-off studies using assessment criteria with much more detailed data, other researchers using a team approach should be able to see the advantages of this particular proposed framework as a baseline from which to proceed.

The MOEs used follow from the five capabilities developed at the end of Chapter III. They address the different dimensions used to examine in the modeling of the probable courses of action for the enemy and ourself. These capabilities - to shoot, move, communicate, know, and react - reflect both the intent and physical capability of the enemy to act. Using them as a guide will help us understand the complex direct and indirect relationships of NLWs to the operational tasks and goals of a mission.

The main benefit of this heuristic QFD approach is that the indirect effect of one measure mapping onto another may be taken into account. Even though we divide out the MOEs into five dimensions, we realize that this type of synergistic warfare (as described and modeled in the earlier theoretical discussion) has to be thought of holistically and the five dimensions are interlinked according to the shorthand cognitive map in Figure 3.3. With there being no way to make the MOE dimensions completely mutually exclusive, cases with interactive effects will be reflected at a commensurate level on the other affected measures. For example, measures for disabling communication that may lead to an indirect impact on one of the other measures, like inability to react for a designated period of time, may show up with a mental addition of the combined direct effect for that dependent measure being rounded up by the reflected indirect effect of the first.

Team members evaluating NLWs using this model would have to be briefed on the fuzzy edges for these measures that may overlap slightly in some cases and take this into account before determining what level of deployment ranking (9, 3, 1, or none) to assign to the other measures as a result of the determined effect on it of the main measure for a particular operational task. The intent is to break out measures for NLWs in as many independent dimensions as possible to get some understanding for how to view their effects,

but this qualitative technique has its limitations. But for now, let us examine the capability measures individually to establish the MOEs for each.

The first capability is the ability of each side to *shoot*, providing supporting fires or individually engaging weapons to destroy or incapacitate the other side. In ARDEC's Alternate Armament Evaluation Methodology (AAEM)¹⁷⁶ analysis of NLWs for four scenarios, the following MOEs were used. The first MOE involved the total number of casualties for U.S. troops that were taken as a percentage of the total force engaged. This needed to be less than 10% of the total U.S. personnel involved for the MOE to be satisfied in "High Confidence" contingency operations. The second MOE developed was a measure of the probability of success for the operation. This needed to be greater than 90% for the mission to be considered a success.

For our analysis, we feel that these values place too loose of a constraint on the number casualties and the probability of success.¹⁷⁷ For contingency operations like the PCOs we discuss, it seems that friendly casualties are required to be at or near zero (less than 2%) and that enemy casualties need to be minimized (less than 10%). Likewise, the probability of success needs to be almost assured (greater than 98%). Although we will not try to evaluate this last aggregate MOE, we feel that it would need to take into account the net effect of the quantitative MOEs and the subjective effects of weapons on the will of the enemy to shoot, move, communicate, know, or react. This morale factor has indirect effects that couple with the direct effects measured by the quantitative MOEs. Where we feel this rationale is valid, and supporting arguments confirm these indirect effects, we will add the subjective effect to the quantitative measure.

Therefore we will classify MOEs under the category of *shoot* as follows: Friendly casualties - near zero (<2%), enemy casualties - minimized (<10%), enemy deterred from

¹⁷⁶ Don Miller, *Reducing Casualties in Contingency Theaters (NLW in SO/LIC and Entry Operations)* (Picatinny Arsenal, NJ: Brief, 10 June 1994). He used combat potentials as "predictors" for measures of effectiveness relating to friendly and enemy casualties and probability for success

¹⁷⁷ They seem to match existing "rules of thumb" for conventional engagements voiced by both Air Force and Army planners.

engaging (<10% of enemy inclined to fire) - which is the result of weapons disabled, fire suppressed, or costs of resistance visually displayed. Enemy fire detected and traced to source (<1 meter circular error probable for location of source). Friendly fires precise with minimum collateral damage or non-lethal for surrounding non-combatants (<2% of non-combatants in immediate area as casualties).

The second capability is the ability of each side to *move* to engage or retreat and to reposition into attack or defensive formations. At the tactical level, this involves land, air and water vehicles or the dismounted movement capabilities of soldiers. The MOE to evaluate this could be represented by a percentage of vehicles disabled (>95%) and the percentage of enemy soldiers frozen in place (>90%).

The third capability is the ability of the enemy forces to *communicate* between and among their separated elements. A NLW that could disable most of this capability would leave them in a dispersed and ineffective state. The MOE may require that almost all electronic communication be monitored or disrupted (>95%). This capability is a good example of where the indirect effects of NLWs may correlate with the direct effects. Some of the anti-personnel weapons that disable or impede the communicators may make the use of communication gear impossible - even without damaging it directly.

The fourth capability is the ability to monitor the above capabilities and make decisions for follow-on actions. This capability is referred to as the capability to *know*. A weapon that addresses this capability would not allow the enemy to know their own or our disposition. They would be effectively blinded or disoriented as to the nature of an ongoing engagement (<5% of their information systems functional or their inability to operate them impaired).

The fifth capability is the ability of the enemy to *react*, thus adapting to the changed situation resulting from moves, actions, or engagement by our forces. As this concept relates to speed of action and the ability to run through the OODA loop, it reflects the ability to support high tempo operations. The time factor that this reaction capability represents is best measured as the time delay or the duration for the effects of NLWs. Because these temporary

or disabling effects can be a result of personnel, matériel, informational, (task) or security (functional) type ROEs for weapons acting to impede the ability of the enemy to shoot, move, communicate, or know, as well as specifically to react, we use the MOEs associated with this capability to measure the net time component of the effect at the tactical maneuver group or operational level.

The other dimension of this time component is the time delay for the weapon to take effect. Although most have almost instant effect, some of the chemical, acoustic, or microwave weapons may take a short while for the effects to take hold. Thus, in a potential shooting exchange where instant effect is preferred, this could be important in determining the suitability of one type over the other. Because the data on potential NLWs is sketchy at best, we will assume all effects are instantaneous for this analysis.

The ability to paralyze, stun, shock, or surprise the enemy is a cumulative effect of physical and morale factors. Lethal weapons, NLWs, and non-lethal tools all play into these effects on reaction time. We recognize this cumulative effect. But, because we are primarily concerned with NLWs in this evaluation, we will try to specifically decouple effects of individual NLWs or tools for their application to the MOEs. The last problem is that in different operations the time scale for the reaction delay requirement varies. For example, in a hostage rescue situation, the paralyzing effect must be instantaneous and widespread, but only need last for a period of seconds. In an urban operation the requirement may be to disable the enemy for a period of 15 to 30 minutes until the objectives can be secured, while at a strategic level, the attack on an enemies information system may need to last for days or weeks to be considered effective. Therefore, within the context of a particular operational task supporting a mission, the MOE will be judged by comparison its ability to meet a time delay of 95% of the target time specified.

C. REVIEW OF MILITARY DIPLOMACY IN THE WEST

The strategic objectives for JUST CAUSE, to capture Noriega and to restore democracy for the government of Panama, drove military objectives that outlined U.S. operations in western Panama after the invasion. As noted in the case study, western Panama presented the last stronghold and chance for Noriega to remain powerful and support protracted conflict in Panama. The first military objective was the quick, decisive surrender of the forces out west to remove this potential supporting infrastructure: the military garrisons, Dignity Battalions, and the key leadership support of the Military Zone Five commander, Lt. Col. del Cid. However, during the initial phase of JUST CAUSE this ranked behind securing the main invasion targets in the central area of Panama and securing the facilities in the Canal Zone. There was going to be a delay after H-hour before this objective could be addressed. The second objective was the smooth transition of these areas back to democratic Panamanian civil rule. This constrained the first goal by requiring minimum force and minimum collateral damage to support the quick changeover to a military assistance mode out west.

The strategy developed was illustrated at the operational level as the "Ma Bell Diplomacy" of Gen. Cisneros. At the tactical level it was centered around the "Mini-Ma Bell" task forces. At both levels this strategy was assisted by "Gunship" diplomacy. The operational tasks that faced this force included the following: maneuver to operate in the enemy's rear area, coordinate a simultaneous show of force with the AC-130 Gunship, accomplish a facilities seizure (the *cuartels*), and quickly secure the immediate outlying area around the facility to quell violence. It will now be instructive to review how well the concepts of control warfare applied to the strategy associated with these operational tasks.

1. Military Diplomacy and Control Warfare

The five main concepts supporting *control warfare*, developed in Chapter III, will be sequentially reviewed in the following order: information dominance, objective, concentration, tempo control, and environmental degradation. Information dominance was achieved out west by first providing the PDF forces and Panamanian people with news and

information of the scale of the attack and the PDF defeat in the decisive D-day battles. PSYOPs personnel assisted the Voice of America (VOA) staff and also operated television and radio broadcast facilities on Volant Solo, a specially modified EC-130, to make sure that they were aware of the new situation for the government of Panama. They also conducted leaflet drops of "safe passage cards" signed by General Cisneros, to induce PDF and Digbats to surrender and support the new regime.¹⁷⁸ The PDF forces out west who had braced for our expected attack, realized that they really had no way of knowing where we would mass or how we would attack. They were forced into a siege mentality. The unsavory prospect of persisting operations against an imminent attack by a perceived dominant U.S. force had a debilitating effect on their morale.

At the same time, Gen. Cisneros's "Ma Bell Diplomacy" was starting to have an effect on the cohesion of the PDF forces. Though he was not able to make direct phone calls to the *cuartels* because of the disconnects between the civilian phone system in Panama and his military offices, he was able to call through the international operator in Miami, who then called the PDF installations long-distance. In consultation with Capt. Jimenez, he reviewed the list of PDF commanders to decide who commanded the most loyalty. The PDF major in charge of Darien province (in the east) received the first call and he obliged by calling his colleagues to persuade them to surrender.¹⁷⁹ But, in fact, all the way out west in Chiriquí, on the twenty-first of December, Major Ivan Gaytan, del Cid's right-hand man, initiated the phone linkup with Gen Cisneros by calling his brother, Moisés, a Catholic priest to work out a deal.¹⁸⁰ This subtle detail, the second thoughts of del Cid and his top officers, illustrates the effect of information dominance on their actions even before Cisneros's "Ma Bell Diplomacy" could be brought into play.

¹⁷⁸ Donnelly, p. 352.

¹⁷⁹ Ibid., p. 352.

¹⁸⁰ Kempe, pp. 18-19. As an aside - Ivan then reached a second brother, Eliecer, a PDF captain in charge of Noriega's Israeli trained special forces, called UESAT. He told him that del Cid was quitting. Eliecer promptly sought refuge the next day in the Nunciatura, (Vatican embassy) in Panama City, promptly removing yet another of Noriega's critical allies in the field.

At the tactical level out west, Major Gil Perez's mini "Ma Bell Diplomacy" served as the coup de grace for the capitulation of the *cuartels* in Santiago, Chitre, and Las Tablas. At each, with an AC-130 simultaneously circling over his head, as soon as the PDF commander responded positively to the phone conversation with Major Perez from the nearby airport the surrender of the *cuartel* was virtually assured. The other aspects of information dominance include the sensors on the Gunship and their ability to look down on the *cuartel* and expose and confirm the disposition of forces in and around it. Communicating this information to Perez's task force immediately after the terms and instructions for surrender were given, gave Perez the information edge as he approached their facilities. Also, as the operation commenced, the helicopter overflight of the *cuartel* by Major Perez and the PDF commander confirmed the preparations for the capitulation and provided the immediate "ground truth" view that the soldiers were assembled on the parade ground as instructed.¹⁸¹

The operations out west supported the enhanced concept of the objective in *control warfare*. The broadened understanding of the commander's intent and concept was necessary to understand the subtleties of designing a strategy that would destroy the will of the enemy without forcing him to be frightened into trying to fight back out of shock or desperation. The small size, excellent training, and cultural and indigenous understanding of the lead task force that went into David reflected this understanding of the objective and the importance of the strategic policy linkage to the tactical task they needed to accomplish. The packaged mix of PDF liaison, (Panama based) 3/7 SFG soldiers, key decision makers, and communications personnel on the two MH-60Gs in the surrender team reflected the precise tuning of the force to accomplish the operational task.

Lt. Col. Joe Hunt, the commander of the 3/75 Rangers, also made sure he clarified to del Cid the compelling environment this small force was being used in when he said to him on the phone that there was a sizable combat force in the air, and "Should there be any

¹⁸¹ Col. Frank Akers (ed.), "Winning the West," *Operation JUST CAUSE: The Warriors* (Compiled reports from operations for USSOUTHCOM: unpublished), p. 6.

problem with this linkup between the special forces element and del Cid, then we would take necessary action." In the earlier operations on the other cuartels, Major Perez's A Co. 1/7 SFG soldiers displayed their strict fire discipline by not firing a round. The only shots fired were at the one *cuartel* in Santiago. A couple of ineffective shots at the landing helicopters were unleashed by a scared PDF soldier before the *cuartel* leadership could subdue him - ceasing the fire.¹⁸² The understanding of the political importance of securing these *cuartels* with minimum force to support both our national objectives and to support the operational objective for the democratic transition of Panama was a critical aspect of these missions out west.

The concept of concentration for these operations is displayed by the ability to appear over the objective rapidly and to seize the *cuartels* before there could be a chance for second thoughts by the surrendering forces. We operated with a firepower advantage as a threat of force which allowed the synchronized maneuver of these small, but high quality, forces to gain relative superiority over the PDF at a time and place of our choosing. The enemy had already been effectively dispersed by our framing attack on the key infrastructure of the PDF. These concentrated operations were all that remained as necessary actions to efficiently end PDF control in the outlying districts.

We were able to maintain tempo control by initiating the timing of these operations to work in conjunction with the preparatory work of information dominance. We dictated the timing after having determined the demoralizing effect in the short interregnum since D-day that had softened the will of these forces to resist. For the David operation, we had the ability to move our task forces into position in a controlled, cascading, sequential fashion that was beyond the ability of the enemy's reaction capability. With the AC-130 overhead and the threat of a large reinforcing task force available to air assault their position, the PDF were put into a dilemma where any thought of resisting the entry task force and the tempo of our operations would result in unacceptable costs.

¹⁸² Ibid., p. 6.

We were able to take advantage of environmental degradation by having the "high ground" with the sensors on the AC-130 providing a detailed view of the enemies disposition while he knew little of ours. Our standoff firepower also tilted the playing field in our favor. And finally, total air superiority allowed us to be air mobile with room to maneuver at our leisure to accomplish the air assault in a controlled fashion.

2. MOE Evaluation of Tasks Out West

To review, the four main operational tasks that were part of the campaign out west to disarm the PDF at minimum cost were as follows: maneuver to operate in the enemy's rear area, coordinate a simultaneous show of force with the AC-130 Gunship, accomplish a facilities seizure (the *cuartels*), and quickly secure the immediate outlying area around the facility to quell violence. They will be examined using the MOEs derived under each of the five capability dimensions developed in our shorthand (designed for examining the enemy and friendly forces in a control warfare campaign). A series of QFD matrices in Appendix Y will be used to visualize this analysis. These matrices will apply to the specific type of mission examined and as such will collectively review the operational tasks that were part of it in an aggregate fashion. For reasons of software matrix size support limits and presentability, the individual matrices will be vertically split by functional category for NLWs, using the established categories: personnel, matériel, information, and security.

This will allow us to judge NLW applicability to the sum total of the operational tasks associated with a mission and develop a raw score based on the perceived military utility of the weapons. In each cell of the matrix, the normal QFD weighting of 9, 3, and 1 will apply to the degree that the "how" (the NLW) seems to support a specific "what" criteria (the MOE). In the lower half of the matrix, the relative merit of the particular "deployed" NLWs will be filtered by summing the weighted and combined effects of the external constraints listed earlier and in the following constraint analysis and taking them into account as a percentage reduction to determine the NLWs net utility.

These external constraints, especially the legal issues, will first be examined in detail later in this chapter to establish the supporting references for their relative correlation to

specific NLWs. The scale used to determine their net impact on the decision to use a particular weapon will be ranked from 0 - 10. This is done so that the constraint may be easily translated into a percentage decrease in the desirability of specific NLW as these external constraints become internalized into the decision problem for use of NLWs. Also, as these constraints are considered as mutually exclusive and additive for simplicity in this evaluation, they will each be given a weighting factor such that they all add up to one hundred percent (i.e. .3, .2, .5) if all considered together and then ranked at full effect in their impact on the desirability of a particular NLW.

A similar procedure will be used to evaluate the MOEs for the second case study, which is described below. After all matrices are completed, a table in Appendix Y will list and compare the scores for NLWs for the operational tasks in each evaluated mission. The next section details the analysis of the missions in the second case study.

D. A REVIEW OF POLICING PANAMA CITY

Urban Operations are difficult, operating forces in these environments subjects troops, vehicles, and aircraft to well entrenched and concealed opponents. Military Operations in Urban Terrain (MOUT) have historically been avoided as a part of doctrine and when undertaken have been bloody and brutish, but in the constrained circumstances involved in PCOs, operating with minimum costs and prevailing in urban environments must be planned for, trained for, and expected. When the frictions of war complicate plans for operating in this type of environment, quick flexible actions must be taken or the opportunity for success will be lost. This analysis for the congregate missions and operational tasks in the second case study will be handled very similarly to the analysis of the first case study.

The strategic objectives for JUST CAUSE (listed earlier) drove the military objectives that defined follow on U.S. operations in Panama City and Colón in the wake of the initial simultaneous attacks. Protection of Americans, defense of the Canal, restoration of democracy, and the capture of Noriega were all included in the military objectives that were being pursued in the urban areas. In more specific terms, General Thurman's broad operational tasks, inherent in his mission, were these: Protect 30,000 U.S. Citizens; defend

142 key facilities along the Panama Canal; neutralize the PDF, who were spread out in some 13 key objective areas; neutralize the nonuniformed, armed Dignity Battalion forces, almost unidentifiable, as they mingled with other Panamanians on the streets, in vehicles of all sorts, and in various buildings; and find and capture the elusive Noriega - who moved on a random schedule and slept in a different house every night. General Thurman's basic strategy was simply stated but complex in execution: "Simultaneously attack the Panamanian combat forces in the Panama City/Colón area and force their collapse."¹⁸³ That strategy supported the execution of a myriad of other specific operational tasks that were included as part of the three main mission area efforts to restore order before stability could be regained in Panama City/Colón: stop the unprecedented looting, stop the sniping and drive by shootings, and provide protection for key facilities that were not included under the umbrella of the H-hours attacks.

In the next subsection we will review how well the concepts of control warfare apply to the three main mission areas listed above. Following that discussion, we will list the main operational tasks that could be cross-listed as part of this follow on urban campaign. The eight main operational tasks that were contained within the missions in the urban areas include the following tasks: denial operations to stop looting, countersniper operations, weapons detection, policing of restricted zones, pursuit operations, isolation of insurgents and enemy leadership from support, accomplish a facilities seizure (the *Marriott*), and quickly secure the immediate outlying area around the facility to quell violence. Then an MOE evaluation using the QFD matrices as already described for the first case study will again be completed to assess how NLWs might project into these operational tasks. The main point to remember for this evaluation is that the QFD matrices will reflect values for conducting the tasks within the real missions conducted, given the constraint that the de facto environment that existed frames any projection of NLWs. We cannot assume that the NLWs

¹⁸³ Flanagan, p. 41.

could have been used with different initial conditions that would have preempted the operational tasks from having to be conducted in reaction to the existing threat.

1. Follow Up Operations and *Control Warfare*

The five main concepts supporting control warfare, developed in Chapter III, will again be sequentially applied to this case study in the same manner as the first case study. The problems with establishing information dominance, outlined in the context of the second case study review in Chapter IV, will be the first concept more deeply examined with regard to each of the mission areas. But first, to be fair, the frictions of war that delayed the arrival of the 82nd Airborne and the 7th LID, were only part of the problem with getting these forces established and deployed to carry out their initially planned for objectives against the PDF and Digbats in the Panama City area.¹⁸⁴ The parachute drop of the heavy equipment and armored vehicles for the 82nd at Torrijos/Tocumen left most of the vehicles in the swamp on the eastern perimeter of the field.¹⁸⁵ Likewise, the 2/7 LID piled up on the ramp at Tocumen on the 21nd of December to find that they were reassigned to support operations out west and the 1/7, which started arriving the next day, received the mission of clearing and securing a major portion of Panama City.¹⁸⁶ This series of events shows how the window of opportunity was further opened for the establishment of resistance operations in the urban areas for both the PDF and Digbats as information dominance of the situation deteriorated..

The unexpected severity of the looting problem in Panama City and Colón added another dimension to the problem of information dominance as the urban jackerie enveloped the cities. Stopping a looting problem once the perception of legitimate control of the situation was perceived to have vanished was a far greater problem than deploying a presence and law enforcement force beforehand. The addition of the Radio Nacional broadcasts further exacerbated the situation and the perception that we were not in control

¹⁸⁴ Ibid., p. 60.

¹⁸⁵ Ibid. p. 165.

¹⁸⁶ Ibid., pp. 198-199.

of the situation with the (a branch of the PDF) police presence effectively cleared out of the way by the start of the attack.

The sniper problems that pinned our forces down also were supported by an inability of information dominance tools to help predetermine, pinpoint, and effectively retaliate for these enemy operations. When lethal counter sniper tools were finally brought into use against them, involving both teams and special operations aircraft, the word must have spread quickly among the Digbats and remnants of the PDF. Very quickly, the sniper activity evaporated, as the cost/benefits advantages it enjoyed as a relatively risk-free venture also evaporated. Information dominance was also lacking when addressing the defense of the Embassy and the tourist hotels. We did not have any way of predicting or stopping the sieges and hostage-taking actions that resulted after the invasion. Without information dominance, the defense of static positions cannot be proactive and NLWs and lethal weapons must primarily be used in a defensive "self security" mode. After control at a facility has been lost, as in the case at the Marriott, the employment of lethal task forces to retake the facility presents much more risk than not losing control in the first place. Although a hostage rescue force may take advantage of the use of NLWs, the enemy forces are already dug in and expecting some kind of retaliatory action.

It seems reasonable to say that the forces that finally received the tasking to operate in the urban areas were dealing with an ad hoc situation that they had not specifically planned and rehearsed for beforehand. For example, the MOUT operations that the 1/7 under the command of Lt. Col. William J. Leszcynski were ultimately tasked to conduct were certainly contained within their repertoire of responsibilities. However, to exploit the idea of an expanded objective, these forces should have been afforded the chance to review in detail the personalities and locations of key players and facilities within their area of operations (AO) before deployment, so that they could quickly spread out and assume their mission when deployed. The interagency coordination (or lack thereof) that left the eight man contingent of Marines at the U.S. Embassy to fend for themselves certainly does not exemplify the uniform application of the objective to all pertinent locations. Finally, the communication

between the arriving evacuation force and the 82nd Airborne troops inside the Marriott hotel appears to have been lacking. This is an indication that the forces were not in sync regarding the objective of the operation.

Offensive concentration of forces in the urban areas was impeded by the vast size¹⁸⁷ and our lack of good knowledge of where to concentrate effectively against the enemy without concentrating inappropriately thus aiding the enemy's efforts to target our forces. Therefore, information dominance of the situation could have provided help with proper concentration of forces. Also, the ability to move about in armor, as in the case of the "Panzer Gruppe" discussed briefly in Chapter IV, was useful as long as there were no enemy weapons deployed that could defeat this type of protection. However, defensive concentration at key sites that the enemy might view as targets of opportunity should have been much easier. With the risk of 20/20 hindsight, it seems that early placement of squad sized units could have helped avoid problems at both the Embassy and the hotels. The earlier suggestion of special forces insertion at these sites before the initial attacks could have also been used as a substitutable option. In all fairness, it is worth noting that the ability to concentrate against relatively static, dispersed regular forces, as in the first case study, is a vastly simpler problem than operations in urban environments that are out of control, require almost zero collateral damage and noncombatant casualties, and offer limited room for maneuver. This type of case seems like a demanding test for forces trying to operate with respect to the principles of control warfare. As pointed out in this analysis, without a fully developed understanding of control warfare, it was extremely demanding trying to react to the small gaps in the plan and operation.

Once forced to operate in a reactive mode to PDF and Digbat attacks, tempo control was also a principle that was hard to regain. The overall loss of control of large elements of the civilian populous coupled with the military situation to create an anarchic environment where anyone moving about was at risk. Regaining the initiative and tempo control required

¹⁸⁷ There were approximately 1.2 Million people living in the metropolitan Panama City area alone. Donnelly, p. 234.

the deployment of large numbers of soldiers to sweep through the neighborhoods affected by the looting. Sadly, the risk involved once the looting started made it necessary to wait until the affected areas were picked clean and the looters had burnt themselves out. Gradually control of the situation was regained, but not without great monetary losses that were going to burden the new government that we were trying to support as one of the main strategic goals of the operation.

Once the sun came up after the night of the initial attacks of the invasion, environmental degradation was a challenge in the urban areas. We had lost some of the physical advantages for masking or concealing our operations. We also lost the informational edge by not completely coordinating our PSYOPS campaign to cover all the existing media for communicating by the enemy and replacing it with our own.

Although the surgical attack that temporarily removed TV Channel 2 from the air before H-hour was masterful, TV Channel 4 was not secured until after the invasion.¹⁸⁸ But, the critical miss was not shutting down Radio Nacional, which broadcast the hastily prepared message that Noriega had recorded, as well as other slogans and rousing speeches to agitate the remnants of the PDF, the Digbats, and people looking to settle scores or do some free shopping in the free-for-all that ensued. If the phone system had been shutdown or monitored, we could have stopped Noriega's escape planning or used it as an intelligence tool.

The public affairs aspects of changing the image of a war environment is in opposition to the quiet, workmanlike role the military uses for operating or patrolling. The ideas of showing presence like that a police force would use for patrolling or that an advertising firm might use to awe a crowd may be worth considering on a non-interference basis with the military missions underway. The morale effect of operations on the populous

¹⁸⁸ McConnell, pp. 113-4; Flanagan, pp. 80-81; and Buckley, p. 175.

seems obvious to anyone who marched into neighborhoods in full combat gear¹⁸⁹ or has ever flown low-level in combat helicopters past cheering crowds of people. However, in the aftermath of the invasion, the poorer residents immediate example of how to act was based on the guidance of the Digbat irregulars who were systematically leading the ransacking of food warehouses, stores, and auto dealerships. Also, the PDF and Digbats had the local knowledge of the streets, alleyways, and structures that aided their sniping efforts. The driveby shooting attempts, although useful for terrorizing the populous, met with little success when encountering well armed and trained U.S. forces. So it seems that the remnants of Noreiga's forces had some aspects of environmental degradation on their side in the opening stages of the urban battles. For us to tip the scales back in our favor required hard work and traditional soldiering augmented by a nascent presence role for light infantry.

2. MOE Evaluation of Tasks in the Urban Areas

To review, the eight main operational tasks that were contained within the missions in the urban areas were as follows: denial operations to stop the looting, countersniper operations, weapons detection, policing of restricted zones, pursuit operations, isolation of insurgents and enemy leadership from support, accomplish a facilities seizure (the *Marriott*), and quickly secure the immediate outlying area around the facility to quell violence. They will be examined in aggregate using the MOEs derived under each of the five capability dimensions developed in our shorthand (designed for examining the enemy and friendly forces in a control warfare campaign). A series of QFD matrices in Appendix Y will be used to visualize this analysis.

These matrices will apply to the aggregate of all missions examined as part of the overall urban operations and as such will collectively review the operational tasks that were part of it in an aggregate fashion. As mentioned earlier, for reasons of software matrix size support limits and presentability, the individual matrices will be vertically split by functional

¹⁸⁹ A quote from Capt. Tom McCool, Commander Headquarters Co. 1/9 Inf of the 7th LID typifies soldier's remarks on the ground in the city, "There's something to be said for seeing thirty guys with camouflage walk into your neighborhood. We provided security." Donnelly, p. 314.

category for NLWs, using the established categories: personnel, matériel, information, and security.

The methodology is the same as for the first case. It will allow us to judge NLW applicability to the sum total of the operational tasks associated with the missions and develop a raw score based on the perceived military utility of the weapons in a similar manner as was done with the operational tasks in the first case study. In each cell of the matrix, the normal QFD weighting of 9, 3, and 1 will apply to the degree that the "how" (the NLW) seems to support a specific "what" criteria (the MOE). In the lower half of the matrix, the relative merit of the particular "deployed" NLWs will be filtered by summing the weighted and combined effects of the external constraints as they become internalized into the decision problem for use of NLWs. Also, as these constraints are considered as mutually exclusive and additive for simplicity in this evaluation, they will each be given a weighting factor as in the first case.

E. GENERAL CONSTRAINT ANALYSIS

One of the first constraints on the use of NLWs would be the actual proof that they are not lethal and that they produce no undesirable side effects. But, this proof may only be substantiated through actual in field use. Because of the paucity of data on the effects of NLWs, a prescription on their possible detrimental effects is best considered in context with a comprehensive review of existing external constraints to weapons in general and to already recognized potential problems with specific technologies. Therefore, besides the necessary constraints of political and military utility; the legal and ethical, as well as the social, informational, environmental, and economic constraints on the use of a particular non-lethal weapon must be addressed. Under this heading, we will review the external constraints discussed above in the following order: the legal and ethical, sociopolitical, informational, environmental, and economic considerations. The legal and ethical considerations will be addressed first, as they are the most controversial constraints on NLWs being argued today.

Because we are addressing their use in PCO or MOOTW missions, across a wide spectrum of conflict, the issue of military law of war becomes enmeshed with international

law and local statutes that may complicate the use of NLWs. Different social or cultural norms, local populace perceptions, and the international media perceptions may effect the suitability of NLWs. The issue of environmental and economic effects, obviously a selling point for non-lethals, may also be a detriment. For these reasons, the weighting of these different constraints may not be mutually exclusive as assumed for this analysis. This is a recognized limitation. Also, the relative weighting between the different constraints could vary based on the environment or functional category of use for NLWs. For this work, these limits will be accepted in the attempt to baseline the decision problem. Areas or type missions where we feel differences would arise will be discussed in the conclusion.

After a review of the literature, the projected types of NLWs, listed in Appendix A, will be weighed against the constraints in Table 1 at the end of the section. The relative weights of all the types of constraints examined in the conclusion of this section will be used to help rank order the suitability of NLWs in the mission-based Quality Functional Deployment (QFD) matrix. In these matrices, in addition to parallelized comparisons of categories of weapons into the MOE criteria, the constraints are applied to (or in TQM lingo, "deployed into") the different types of non-lethal weapons to filter their merit.

1. Legal and Ethical Constraint Analysis

As stated above, the legal and ethical considerations will be addressed first, as they are the most controversial constraints on NLWs being argued today. We will start with a review of the legal framework for the usage of weapons in general within the law of war. Then, because the methodology for determining if specific type weapons are even "legal" is governed by international law, a review of both the basis of the law and the treaties that may be applicable to NLWs will be completed. Next, because the MOOTW environments in these PCOs produce situations similar to conventional and unconventional wartime conflict, peace operations, internal unrest, and political violence; some recent (since the 1960s) anecdotal examples from conflict situations and internal policy responses to political violence and civil unrest will be used to provide background for this constraint as well as the other constraint categories. These recent historical examples of NLW usage will help

develop the defining characteristics for each type of constraint. Arguments in the current literature on NLWs will be examined to see what weapons have raised the most contentious issues regarding these constraints. After a review of the literature and reference to open sources on the possible effects of certain types of these weapons, the projected types of NLWs (listed in the Appendix) will be weighed against the legal and ethical constraints, as well as the other constraints in Table 1.

This review of the Law of War and NLWs will highlight the major historical legal actions that have been applied to the conduct of war. While most cultures saw the need to restrain the horrors of war, and in the Middle Ages there were laws as to where and when fighting was allowed, it was not until the nineteenth century that international laws were codified. In general, the law of war in its modern form has its roots in the Saint Petersburg (Russia) Declaration of 1868, as it was the first international treaty imposing restrictions on the conduct of war.¹⁹⁰ The main emphasis of this Russian Government Declaration was the prohibition of explosive projectiles under 400 grams. There was a humanitarian tone to this declaration:

Considering the progress of civilization should have the effect of alleviating as much as possible the calamities of war. . . the only legitimate object which states should endeavor to accomplish during war is to weaken the military forces of the enemy. . . it is sufficient to disable the greatest possible men, and . . . this object would be exceeded by the employment of arms which uselessly aggravate the sufferings of disabled men or render their death inevitable. . . [The use of such weapons] would therefore, be contrary to the laws of humanity.¹⁹¹

In regard to future weapons the Declaration stated the following: "The contracting or Acceding Parties reserve to themselves to come hereafter to an understanding whenever a precise proposition shall be drawn up in view of future improvements which science may

¹⁹⁰ Major Maura T. McGowan, "Non-Lethal Weapons and the Law of Armed Conflict," p. 1, a 10 December 1994 draft of Chapter II for *Non-Lethal Weapons and Special Operations: Technologies, Legalities, and Potential Policies*, an INSS sponsored study for USAF/XOXI (unpublished), Maj McGowan worked for Air Force Special Operations Command (AFSOC) in the SJA office at Hurlburt. Also see W. Michael Reisman and Chris T. Antonio, *The Laws of War* (New York: Vintage Books, 1994) for a comprehensive collection of 20th century documents on the legal context of conflict.

¹⁹¹ Ibid., p. 1.

effect in the armament of troops in order to maintain the principles which they have established."¹⁹² In essence, this declaration stated that the legality of a future weapon needed to be judged by balancing the military necessity or utility of a future weapon against the necessary suffering it could incur.

Also, during the U.S. Civil War, President Lincoln issued the unilateral Instructions for the Government of Armies of the United States, commonly known as the Lieber Code.¹⁹³ The Lieber Code set out rules for the Union Army for the conduct of warfare and the protective treatment of categories of persons including civilians and prisoners of war. The Lieber code was a unilateral code, imposed by one army to be binding only upon itself.

It was followed by a number of multilateral treaties covering the conduct of warfare between nations. In 1899, The first Hague Peace Conference outlawed the use of so-called dum-dum bullets. They were considered to be excessively injurious. The first and the second conference in 1907, also codified a prohibition on the use of poison and poisoned weapons. Under the Hague Regulations the employment of arms, matériel, or projectiles designed to cause unnecessary suffering is prohibited.

The next major step in expanding the law of war was the 1925 Geneva Protocol for the Prohibition of the use of Asphyxiating, Poisonous or other Gases and of Bacteriological Methods of Warfare.¹⁹⁴ The prohibitions in this treaty were not absolute. Reservations expressed at the time made it clear that a number of countries considered themselves free to use chemical or biological weapons in retaliation, should their adversaries use them first. The U. S. has reserved the right to use chemical weapons against a state if that state fails to respect the prohibitions of the Protocol. The Protocol is generally considered to include both lethal and incapacitating chemical agents. After considerable debate, in 1975 the U.S. also

¹⁹² Ibid., p. 2.

¹⁹³ General Orders No. 100, Instructions for the Government in the Field, (1863), found in Schindler and Toman, p. 101.

¹⁹⁴ McGowan, p. 3., and Major General Bengt Anderberg and Dr. Myron L. Wolbarsht, *Laser Weapons: The Dawn of a New Military Age* (New York: Plenum, 1992), p. 206.

renounced the first use of riot control agents in war except in defensive military modes to save lives. The use of tear gas is restricted by an Executive Order. Presidential approval is required in advance for any use in armed conflict of herbicides or riot control agents, even under defensive military conditions.¹⁹⁵

The Geneva Conventions of 1929 and 1949 focused on ameliorating the conditions of civilians, prisoners of war, and the sick and wounded. The latest amendments to the law of armed conflict are contained in the 1977 Protocol. It contains the Convention on the Prohibition of Chemical Weapons, and the U.S. has not ratified it at this time.¹⁹⁶ In 1969, because of the horrific nature of biological weapons, President Nixon announced that the U.S. would not use them under any circumstances. In 1975, the U.S. ratified the Convention on the prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and Their Destruction. The criteria used for characterizing the use of the biological agents is whether or not it is a hostile use, not whether or not it will result in death.

Some of the contentious legal issues that have persisted even after the ratification of Protocols follow. The U.S. has historically argued the dichotomy of allowing the use of riot control gases by a nation's police force against its own citizens while prohibiting their use against enemy combatants in battle. Also, the U.S. has argued that herbicides involve the same chemicals and had the same effects of materials used by countries to control their own

¹⁹⁵ U.S. Army, *Basic Course on the Geneva Conventions of 1949 and Hague Convention No. IV of 1907* (The Army Institute for Professional Development, n.d.), p. 7. McGowan, p. 5. In 1975, President Ford issued an Executive Order renouncing first use of riot-control gases and herbicides except in limited noncombatant situations.

¹⁹⁶ McGowan, p. 3. Reference to Reisenstein, *Chemical and Biological Weapons - Recent Legal Development*, 12 Brooklyn J. Int'l L., note 36, 105, (1986) is also given in this work. It seems that the biggest reservation that the U.S. has to this ban on all chemical weapons is the lack of teeth for verification or enforcement. Ratification of this protocol is expected in 1995.

vegetation. It argued that the use of herbicides and defoliants may be more humane in some cases than the use of conventional weapons.¹⁹⁷

Subsequent cumulative reviews of the protocols and other international actions have resulted in the establishment of the following general format for questioning the legality of a particular weapon. These will be reviewed and then applied to the three most controversial potential non-lethal weapons: laser, chemical, and biological based NLWs.

1. First, can this weapon legally be used? The protocols are then reviewed and then the next question may be asked.
2. If the weapon is legal, is the proposed use of it legal? Three things are considered in a review of the laws of armed conflict: military necessity, humanity, and the rule of proportionality. The rule of proportionality requires the balancing of necessity with humanity.
3. Principles governing weapons - they must not cause unnecessary suffering, produce indiscriminate effects, or violate restraints imposed by Custom or Treaty. Weapons may only be used against military objectives. The complication to this is that some objects are considered dual use. They meet the needs of the civilian population but also effectively contribute to the enemy's military action. These objects may be attacked if there is a military advantage to be gained by their attack.

The U.S. follows the Department of Defense Instruction 5500.15 which requires that a weapon or munitions undergo a legal review during its development and prior to acquisition and fielding to ensure that the weapon or munitions in question complies with the international law obligations of the U.S. The only other country with similar internal regulations is the former Federal Republic of Germany. Additionally, a duty for all countries to evaluate new weapon developments and tactics was established in international humanitarian law in 1977.¹⁹⁸

¹⁹⁷ Ibid. , p. 5. The use of herbicides must also be in accordance with the 1977 Environmental Modification Convention (ENMOD). The convention requires that parties not engage in modifications having widespread (an area of several hundred square kilometers) long lasting (a period of months or approximately a season or more) or severe effects (serious or significant disruption or harm to life, natural or economic).

¹⁹⁸ Anderberg and Wolbarsht (1992), p. 208.

Obviously, not all nations have followed these legal Protocols. Additionally, the restrictions are not always proactive, for example, the gas protocols were issued in response to the Germans' use of chemical weapons in World War I. In effect, the specific new classes of recently proposed NLWs may have to be used before their effects may be judged as either warranting additional protocols banning them or considering their use as contained within existing restrictions. Some of the concerns with proliferation of the more virulent versions of possible NLWs deal with the historical examples like the Italians use of chemicals against the Ethiopians, the Japanese use against the Chinese, the Soviets use against the Afghans, and the internal Iraqi use against the Kurdish minorities. This last example in this list falls outside of the purview of international statutes, but it was an horrific recent example of the type of regional conflict in fractionated states that may be fought with brutal measures where maiming and lethal weapons are judged for efficiency only and where the leadership may not care about the censure of the international community.

a. Lasers as NLWs

Probably the most contentious arguments concerning the legality of a potential technology that also seems likely to offer great potential as a NLW have involved the use of low-power lasers as dazzling or blinding devices on the battlefield. The starting point for the assessment of laser weapons in the international context must begin by a consideration of the biological effect of these weapons on human beings as compared to the military interests involved. Using the three step format listed above, we can see that the first question has already been answered differently by various sources.

The U.S. has reviewed the use of laser weapons in accordance with DoD instruction 5500.15 and issued a memorandum of law that states that the use of a laser as an antipersonnel weapon is lawful. The fundamental issue in the review is whether the use of a laser to blind an enemy soldier would cause unnecessary suffering and therefore be unlawful. The memorandum notes that it would be legally inconsistent if a determination was made that "a soldier legally could be blinded ancillary to the lawful use of a laser range-finder or target acquisition lasers against material targets, but could not be attacked

individually."¹⁹⁹ The logic of the argument makes sense in the context of conventional war and the widespread usage of legal measures that could cause similar blinding from ancillary effects, not only from laser use, but from blast or fragmentation. The "proportionality of means test" listed as the third part of question two, seems to bring into question the humanity of the use of lasers as blinding measures in MOOTW or PCOs unless they were used in situations involving direct conflict with other conventional means or if U.S. personnel were subject to grave threat to life and limb.

If the situation does not meet these conditions, we feel that the use of lasers as NLWs needs to be precisely controlled so that the measured dosage of light energy merely dazzles the receiving individual, without causing permanent damage. Using laser weapons as convenient tools to blind adversaries in MOOTW environments, even if judged legal, would certainly raise ethical issues and questions of economic liability for the care of individuals who would live out the rest of their life maimed. Indeed, it would be hard to still consider lasers as NLWs according to our original definition, if they do permanent, debilitating harm to people. Certainly, the U.S. could not afford the informational problem that the "CNN effect" would instantly shove in the face of the policymakers who had directed the use of such weapons.

Some scholars, in particular experts from Switzerland and Sweden, argue that intentionally using a laser to permanently blind a combatant is a disproportionate injury to the gained military advantage. It is their contention that intentional irreversible blinding by a laser constitutes "unnecessary suffering."²⁰⁰ Others, however, recognize that the blinding of an occupant of an aircraft, tank, or other fighting equipment incidental to the functional kill or physical destruction of that high value military weapon, does not contravene the existing principles of humanitarian law if the laser offers military advantages not matched

¹⁹⁹ "Memorandum of Law: The Use of Lasers as Antipersonnel Weapons," *The Army Lawyer*, November 1988, DA PAM 27-50-191, pp. 3-4.

²⁰⁰ Anderberg, pp. 212-214. They propose an international document on antipersonnel weapons with a dual ban on tactics and weapons.

by other weapons.²⁰¹ One concern that we have as a result of this line of reasoning is the double standard on the battlefield regarding what is fair to use against who. For example, consider the following two questions. If I am flying a helicopter in a contingency operation, should I be subject to being blinded by a laser weapon wielded by an insurgent which subsequently causes my aircraft to crash? Should I accept this without recourse to the use of similar self-defensive weaponry against my dismounted attacker? We think this approach reveals the brinkmanship problem contained in such reasoning. It also reveals the necessity for a civilized power like the U.S. to adhere to the rule of law while a less scrupulous foe can take advantage of the poor man's excuse for doing whatever it takes to win.

During the 1979 session of the UN Conference on Certain Conventional Weapons a resolution was adopted relating the old dum-dum prohibition to the need for caution regarding modern weapons. Under the Certain Conventional Weapons Convention, international discussions are now under way that may lead to the development of specific new protocols covering electromagnetic weapons. A report is expected next year. One author suggests that "The current surge of interest in electromagnetic and similar technologies makes the adoption of a protocol explicitly outlawing the use of these dehumanizing weapons an urgent matter." This same author doubts the ability to tune these weapons precisely enough to control the severity of the effects.²⁰² Martin van Creveld, puts this debate in historical perspective when discussing the history of the law of war and weapons development:

One very important reason for disliking a weapon was of course because it was new. A new weapon might or might not be effective, but whenever one was introduced it always threatened to upset the traditional ideas as to how war should be waged and, indeed, what it was all about. This explains why weapons classified as "unfair" often make their appearance

²⁰¹ Ibid., p. 210. View of C. Greenwood of Cambridge University (and it seems the author) as expressed in a presentation before the 1989 ICRC round table of experts. He also stated that the use of laser weapons against these protected or fast moving personnel is more readily justified because alternative weapons are less effective against such people than against infantry in the open

²⁰² Barbara Hatch Rosenberg, "'Non-lethal' Weapons May Violate Treaties," *Bulletin of the Atomic Scientists*, v50, n5 (Sep-Oct 1994): 44-45.

during periods of rapid technological progress; good examples are provided by the Greek catapult (invented in Sicily around 400 B.C.) and, of course, early firearms.²⁰³

The imbroglia surrounding laser weapons, may be similar to the early feelings about firearms, in that the widespread availability and effectiveness of these weapons represent a weapons revolution driven by a burgeoning technological age of innovation that will not soon pass. To offer a glimpse of what is right around the corner, we offer the following example to close this discussion:

The U.S. Army is planning to field a highly classified, M-16 rifle-mounted laser weapon with its infantry (three per platoon) and scouts in the fall of 1995. Called the AN/PLQ-5 Laser Countermeasure System, it will provide the individual soldier a non-lethal weapon that can detect and disrupt optical and electro-optical targeting systems on armored vehicles at "stand-off ranges."²⁰⁴

b. Chemicals as NLWs

The next class of weapons we will review is represented by all the different types of personnel and anti-matériel chemical weapons being proposed. Of this class the anti-personnel chemicals have raised the biggest legal questions, as already reviewed by the earlier discussion on the Chemical Weapons Convention (CWC) and the Geneva Protocol. The CWC is expected to be voted on in 1995 (arguments developed in it stem from the 1977 Geneva Protocol). The primary thrust of this measure concerns the total banning and destruction of all chemical weapons. In this document, these weapons are defined as "any chemical which through its chemical action on life processes can cause death, temporary

²⁰³ Martin van Creveld, *The Transformation of War* (New York: The Free Press, 1991), p. 83. Not to discount the validity of the laws of war, he later goes on to explain that the law of war is a necessity, "The purpose of the law of war is not, as Clausewitz and many of his followers seem to think, simply to appease the conscience of a few tender-hearted people. Its first and foremost function is to protect the armed forces themselves. This is because war is the domain of uncertainty and agony. . . it must involve the cooperation of many men working as a team. Men cannot cooperate, nor can organizations even exist, unless they subject themselves to a common code of behavior. The code in question should be in accord with the prevailing cultural climate, clear to all, and capable of being enforced."

²⁰⁴ Glenn W. Goodman, Jr., "Upping The Nonlethal Ante: Pentagon Funds A New Weapons Initiative," *Armed Forces Journal International*, July 1994, p. 13.

incapacitation or permanent harm to humans or animals."²⁰⁵ The definition would include substances such as caustics and other chemicals not usually classified as poisons.

This seems incongruous in the current climate of increased U.S. involvement in frequent peacekeeping and humanitarian assistance operations where our national interests are marginal and at the same time where there is a greater public sensitivity to military and civilian casualties. There has been an outcry for less lethal measures at the same time the CWC calls for more restrictions on possible chemical non-lethal options. Couple this with the historical U.S. legal disagreement with the dichotomy that exists between domestic use in policing and the international use in policeman-like "peacekeeping operations" and the deeper contentiousness of the CWC debate blooms. First, we will review the recent use of widely available commercial cayenne pepper sprays (a disabling usage) in a peacekeeping environment and second we will discuss the subject of calmativ sprays.

The U.S. used cayenne pepper spray (as a new, more effective, natural version of mace or CS type tear gas) in Operation *Restore Hope* in Somalia when lesser measures of nondeadly force or resistance (i.e. batons, barbed wire entanglements around vehicles, and avoidance of crowds) proved inadequate to stop the swarming of vehicles and looting by Somali men and children, when they knew our ROE restricted us from using lethal force. The spray was so effective that by the end of the operation merely waving any aerosol can in the air was said to ward off Somalis.²⁰⁶ However, three problems surfaced with its use:

1. Dispensing it to troops in theater without proper training, may have lead to its inappropriate use on some occasions and from first hand reports it definitely lead to the self administering or accidental spraying of fellow soldiers by untrained operators.
2. Fear of its inappropriate use led to a delay in requesting it in the first place.
3. Some soldiers, hesitant to use deadly force already because of pending Article 32 cases, used it instead of the more appropriate deadly force in some engagements.

²⁰⁵ The full text of the CWC may be viewed on the internet at the University of Manitoba gopher server.

²⁰⁶ Col. F. Lorenz, "Law and anarchy in Somalia," *Parameters* (Winter 1993-1994), p. 34.

But, in the end the spray would have to be judged as an effective means of proportionate non-persistent force against low-level threats.²⁰⁷

It is the U.S. interpretation that the CWC does not apply in peacekeeping or humanitarian operations (although as noted, use does require Presidential approval). It is interesting to speculate on the debates when ratification of the CWC in 1995 is expected. The larger question for this study is how do peacekeeping (PK) and humanitarian assistance (HA) operations get compartmented out from other missions and operations in the PCO, "special wars" we may be involved in? This differentiation of ROE based on mission would cause properly trained troops not to be able to use the most appropriate level of force. Based on legal interpretations, they could be held liable if they could not justify that their particular task fell under the PK and HA umbrella if and when they used the spray.

The second anti-personnel type of chemical weapon proposed is in the category of calmative agents. These agents are more subtle in their approach. A crowd or area sprayed with these agents would be relaxed or become drowsy or fall asleep. There is some anecdotal evidence that the Soviets used some experimental types in this category in Afghanistan (as well as more noxious and deadly agents). Reports indicate that the Mujaheddin would lie down and go to sleep until they awoke later in Soviet custody. The reports are discounted as such a chemical has not proven effective.²⁰⁸ The U.S. once possessed the proactive hallucinogenic drug BZ, but has since abandoned it. BZ is on the schedule of forbidden drugs of the Draft Chemical Convention, its use would be prohibited by law. The calmative class of chemicals would be "any chemical not listed in a Schedule which can produce rapidly in humans. . . disabling physical effects."²⁰⁹

The last type of chemically-based anti-personnel weapons that has produced some debate includes some sticky foams that when dispensed impede the movement of an

²⁰⁷ Jonathan T. Dworken, "Rules of Engagement: Lessons from *Restore Hope*," *Military Review*, September 1994, pp. 26-34.

²⁰⁸ H. Crone, Banning Chemical Weapons, 18 (1992), cited in McGowan, (1994), p. 12.

²⁰⁹ CWC text (on internet).

individual. The interesting question here is whether the disablement is purely a mechanical hinderance or based on the chemical action of the foam. The same arguments could be lodged against sticky nets, especially the proposed "stinging" sticky nets that dissuade an individual from moving around much or resisting after being captured in the net because of the irritating chemical released by abrasion by the net. However, it seems like these questions seem much less controversial than the previous ones regarding CS type tearing agents or potential calmatives.

A number of the proposed chemical NLWs include anti-matériel measures. Combustion inhibitors, inorganic super-reagents, super-sticky, anti-traction and liquid metal embrittlement define some of the most often cited classes. If the chemical which comprises the weapon is listed on the schedule of prohibited chemicals it may be possible to claim that they are exempt weapons. These chemicals are "not dependent on the use of the toxic properties of the chemicals as a method of warfare." "Toxic properties" means using chemical action on life processes that cause death, temporary incapacitation, or permanent harm to humans or animals." Questions brought up by critics of these proposed anti-matériel measures include misapplication to humans or animals and unplanned secondary effects on people. Accordingly, if used as they are designed to be used, and they have no unexpected secondary effects, these weapons would not be in violation of the Chemical Weapons Convention.

c. Biologicals as NLWs

The last class of NLWs examined in this study are the proposed biologicals. The proposals that we are concerned about deal only with anti-matériel measures like bacteria that eat electronic semiconductor material or that grow rapidly and gel POL supplies. Besides the ratification of the Convention on the Prohibition of Biologicals (BWC) in 1975, and Geneva Protocols banning their use, just the thought of biologicals produces emotions of fear and revulsion in most people. As reviewed in Chapter 11 of the Swedish International Peace Research Institute (SIPRI) Yearbook 1994: World Armaments and Disarmaments, with the criteria that it is hostile use, not disabling or deadly intent that is banned, the

assessment is "that the development of such agents for offensive warfare purposes would be prohibited by the BWC."²¹⁰ Major McGowan, in her Air Force directed study, similarly has concluded that:

Some bacteriological agents have genuine medical uses and stockpiling for these purposes are not objectionable. Accordingly it would follow that the use of bioremediants [i.e. oil spill eating bacteria] to clean up an oil spill would be legal under these conventions and treaties, but the use of these same agents to destroy an enemy's fuel supply would be the use of biological agents with a hostile intent and therefore illegal.²¹¹

We must therefore also conclude that the investigation of biological NLWs would be fraught with legal and ethical challenges. But, with the diffusion of technology in the emerging information age and the advances in work on recombinant DNA and biophysics, one would be remiss not to expect unscrupulous international actors to experiment with "bad" bugs. It seems, however, that for the U.S., the marginal interests sought or goals supported through the use of these weapons could be better substituted for by a more palatable weapon.

This review of the legal and ethical constraints formed by the current legal environment and the ethical concerns about three main classes of NLWs: lasers, chemicals, and biologicals forms the basis for the background that we will use to make judgements in the QFD matrices evaluation. Before actual use of NLWs, the specific "local" statutes also need to be considered in addition to the law of war, international law, and treaties when evaluating the use of NLWs in a particular region. The best source of this type of fine-grained information may only be available before deployment from the command Staff Judge Advocate.

2. Sociopolitical Constraint Analysis

The idea behind sociopolitical constraints is that there is a variance in acceptability and appropriateness for different types of non-lethal means based on regional, ethnic, religious, or other traditional cultural expectations. This hypothesis, that the use of a tool in one theater of operations may not correlate with its use in another, could require its own

²¹⁰ Richard Kokoski, "Non-Lethal weapons: a case study of new technology developments," *SIPRI Yearbook 1994*, Chap. 11, p. 384.

²¹¹ McGowan, (unpublished draft), p. 9.

stand alone detailed research study using a region by region survey . But, for the purposes of our discussion, we will only use three anecdotes to illustrate this idea. The bottom line is that we may neglect these more subtle factors at our own peril when trying to conduct knowledge-based control warfare. Measuring this constraint will be considered beyond the scope of this thesis and we will produce no numbers for weighting the QFD analysis. However, we will be concerned with measuring the informational aspects of the use of NLWs, and as such these sociopolitical factors will indirectly be accounted for in this measurement.

The first anecdote that we will review concerns the use of bayonets in quelling a riot associated with a strike on Okinawa. The second concerns National Guardsmen trying to control student protesters on U.S. university campuses. The third concerns the use of NLWs by U.S. soldiers against the Somalis. These three anecdotes are selected to illustrate the sometimes surprising unacceptance, difficulty of domestic use, and the sometimes surprising acceptance of NLWs based on different sociopolitical settings.

In the summer of 1969, U.S. MP's in attempting to quell a riot among striking Okinawans who were blocking a gate at a U.S. base used fixed bayonets on their weapons as a riot-control instrument. An Okinawan, Mr. Asato, was slightly wounded in the altercation and the event turned into an international incident. The following excerpt from the New York Times illustrates the complexities involved in the use of NLWs:

To many Okinawans, the most serious aspect of the affair is not that Mr. Asato was slightly wounded but that the Americans, the rulers, used bayonets against Okinawans, the ruled. There is apparently a wide cultural gap on this score. Americans, both military and civilian, say that the bayonet is a recognized riot-control instrument, frequently used as such in the United States.

To the Okinawans, and even more so to their fellow countrymen in Japan proper, the bayonet is a weapon of war, arousing painful memories most people would rather forget. In prewar Japan, there was a whole mystique about swords and their use, which extended to the bayonet used by infantrymen. There is general agreement that no postwar government could have used bayonets in a riot and survived.²¹²

²¹² *New York Times*, Pt. C, June 10, 1969.

The bottom line when thinking of the sociopolitical influences on the decision to use a particular NLW is the answer to the question, "In this instance will this use coerce with the desired effects or will it provoke an undesired response?"

During the same period of time as the preceding example, the Vietnam War generated protest movements at major universities in the U.S. In a few cases the National Guard was called in to quell the unrest. One specific example of the use of fixed bayonets against college students was at the University of California Berkeley campus where Guardsmen with fixed bayonets twice turned back marches of several thousand demonstrators who were protesting police use of guns on demonstrating students. However, most of the students refused to really take the bayonets seriously. Taunting the Guardsmen, they walked up to the bayonets challenging the soldiers to stab at them while they flashed peace signs at the soldiers. They had little fear of the bayonets because they could not image a Guardsman bayoneting an American student.²¹³ Unlike the later deadly incident at Kent State in Ohio in 1970, there was not any fear that the Guardsmen would use less-than-lethal or lethal force.

As pointed out by Coates in his study of non-lethal weapons, stabbing and cutting weapons are classical military weapons and their use in lethal military operations is quite well known. In some more aggressive military operations, while using the threat of lethal force, perhaps their use may not be misconstrued as too violent or assumed as not legitimate and therefore not threatening.²¹⁴ These two short historical examples above were used to show how sociopolitical factors could narrow the applicability for a particular NLW. Hopefully these simple examples may reinforce the need for a regional approach to strategy when determining the use of NLWs. If this approach is not convincing, then please consider the converse example to the first two examples by examining this next more recent anecdotal incident.

²¹³ *Time*, p. 23, May 1969. *Examiner*, Washington, D.C., May 22-24, 1969.

²¹⁴ Coates, p. 46.

To deal with the starvation problem in Somalia, the UN authorized a U.S.-led intervention in December 1992. The U.S. Central Command (USCENTCOM) established Joint Task Force (JTF) *Somalia* to perform *Restore Hope*. The First Marine Expeditionary Force (I MEF) and a task force of U.S. Army, TF 2-87 (10th Mountain Division), made up the bulk of JTF *Somalia*.²¹⁵ Of the many lessons learned in this operation, rules of engagement (ROE) issues figured prominently.

The situation on the ground was complex. Most Somalis carried weapons openly before the UN intervention. After convincing them that they were not going to be allowed to continue to do so, the troops still had to deal with other problems when operating in towns. Driven by the lack of schools, massive unemployment, and poverty, young Somali males formed roving gangs and turned to thievery. When stopped in towns due to traffic, the U.S. troops faced swarms of these young men, trying to steal anything they could.

According to the CJTF OPLAN, the ROE in Somalia dictated that when U.S. forces are attacked by unarmed hostile elements, mobs, or rioters, they should use the minimum force necessary under the circumstances and proportionate to the threat. It did not take long for the Somali people to know the ROE and push it to the limit. The soldiers quickly found themselves robbed of just about everything (except their weapons - which they could shoot to protect) that was not nailed down. Before cayenne pepper spray was introduced into theater, they had found a solution that may not seem appropriate in other surroundings. They developed a means to counter these threats - means short of deadly force - which included carrying tent pegs, batons, and sticks to repel the Somalis.²¹⁶

This solution may sound overly brutal and one may think that it would have been provocative in most environments to see heavily armed soldiers beating off children with sticks. However, in interviews with a SEAL sniper who was involved in the operation, it

²¹⁵ Jonathan T. Dworken, "Rules of Engagement: Lessons from *Restore Hope*," p. 27 and Major Martin N. Stanton, US Army, "Task Force 2-87: Lessons from *Restore Hope*" *Military Review*, September 1994, pp. 35-41.

²¹⁶ Dworken, p. 30.

turns out that the Somalis considered this method of coercion acceptable.²¹⁷ It seems that the tribal elders also used sticks to beat off and to discipline these young hoodlums. And so for this last anecdote, NLWs that would seem abhorrent and provocative under western standards were not constrained by the sociopolitical factors in Somalia. Hopefully this last simple example may be more convincing than the earlier anecdotes in reinforcing the need for a regional approach based on sociopolitical factors when determining the use of NLWs.

3. Informational Constraint Analysis

This constraint is the subjective measure of the "CNN Effect" on international information campaigns that may accompany the use of NLWs in a particular operation. Whereas the last constraint concerned the "local" or regional response to the use of NLWs, this constraint primarily reflects the international and domestic U.S. audience response to actions involving the use of NLWs. For this reason, to be prescriptive, a cross-functional team of experts that would use regional or area specialists to evaluate the last constraint would be replaced by public relations, information, and PSYOPs personnel to evaluate the subjective measure for NLWs under this constraint. As mentioned earlier, these two measures may not be mutually exclusive and it should be expected that there would be indirect effects of one upon the other.

For this one man study, that looks back on historical case studies during Operation JUST CAUSE, determining a qualitative measure should not be difficult. This measure will be assigned based on a review of the extensive media and press coverage of the invasion. Again, because the QFD matrices allow an audit trail and a sensitivity analysis, in the conclusion we will discuss the amount of impact that varying the assigned value may have on the results. Any reader would be able to similarly judge weighting or "deployment" differences based their own evaluation values.

²¹⁷ Interview with Lt. Mike McGuire at the Naval Postgraduate School. 15 Nov 1994.

4. Environmental Constraint Analysis

The use of some NLWs, especially those that target matériel or information systems, could have ecological or environmental effects that are persistent. The damaging effects of biological, chemical, and electromagnetic weapons come to mind as possibly creating collateral effects that constrain the use of such weapons. Environmental warfare has been practiced throughout history. Scorched earth campaigns, slaughter of livestock, poisoning of wells and damming of water sources, and other destruction of infrastructure have been used to help defeat the enemy. However, in no period of time has the ability to create environmental havoc equalled the potential today. With the increased demand for resources for industrialized societies and to support the population explosion, and our increasing awareness of the long term effects of existing pollution, any usage of a weapon system needs to address the impact it will have on the environment. The next example illustrates the most recent case of non-lethal warfare using environmental means.

Two recent incidents in the Gulf War offer an extreme example of environmental warfare. After the air war began, Saddam Hussein's Iraqi forces first opened valves on oil terminals causing a massive oil spill into the sea and then later as they made their retreat at the end of the ground war, they detonated plastic explosives on the wellheads of most of the 1,080 working oil wells causing hundreds of oil fires.²¹⁸ This "poison pill" approach was described by Saddam in an interview with Peter Arnett of CNN as using oil as a weapon "of legitimate self-defense."²¹⁹ The Kuwaitis called it an act of ecological terrorism and many scientists viewed it an environmental catastrophe of unprecedented scale.²²⁰ The weapons that we might employ should obviously not be tailored to produce these kind of effects as their primary purpose. However, we should anticipate having countermeasures for such actions.

²¹⁸ Thomas B. Allen, F. Clifton Berry, and Norman Polmar, *War In the Gulf: From the Invasion of Kuwait To the Day of Victory and Beyond* (Atlanta, GA: Turner Publishing, Inc., 1991), pp. 73, 162.

²¹⁹ January 28, 1991, Peter Arnett Interview with Saddam Hussein in his bunker in Baghdad, Iraq.

²²⁰ Allen, pp. 162, 220.

To determine the environmental constraints on specific NLW categories and types a combined assessment of their net effect on natural and man-made infrastructure may be necessary. For example, a conventional electromagnetic pulse (EMP) weapon may damage the computerized safety systems on nuclear power facilities causing an environmental catastrophe. Or less dramatically, a computer virus may infect the process monitoring system at a chemical plant leading to the flushing of toxic chemicals into the sea. Finally, an acoustic infrasound weapon may weaken structures that are susceptible to later earthquake damage. Although these examples may be considered fantastic exaggerations, the point is that the natural and man-made systems that exist could be damaged and then damage the environment either directly or indirectly. In the QFD analysis, this linked environment will be considered as the various NLWs are "deployed" into the environmental constraint.

5. Economic Constraint Analysis

In today's international environment, world economic interdependence and instant communications link most parts of the world together as a system that responds to events in one region with immediate financial implications for us all. America cannot afford another Marshall Plan, in fact, our current deficit crisis is pressuring the government to scale back aid to our allies and there is great resistance to pouring money into rebuilding an old enemy. The public and congressional debate over Russian aid is the best contemporary example. According to reports, the current Commander in Chief tightly monitors the relationship between foreign policy decisions and American economic prosperity, and he asks his staff to evaluate the economic impact of every decision.²²¹ As the military is one of the four main policy tools (combined with political, economic, and informational) that are increasingly interleaved together to execute foreign policy, it only makes sense that the end economic state be factored into military employment and targeting of weapons.

If we have no responsibility to rebuild what we destroy or disable, then economic cost is not a factor. However, in most of the PCO scenarios like JUST CAUSE this would not

²²¹ *US News and World Report*, April 5, 1993, p. 41.

be the case. Even in the Gulf War the economic factor was a consideration in our targeting of Iraq's electrical system and fuel production. These targets were attacked with precision weapons at critical nodes, to achieve functional destruction of those systems while limiting the physical damage.²²² Although an enemy may elect to not fix the functionally killed systems to defeat this policy, informational tools should be able to make that fact known to his populace to reduce perceptions of legitimacy for the enemy regime.

As well as looking at the economic constraints for usage of NLWs, the positive aspects for some weapons may be the drastic reduction in the costs associated with the after effects of an operation. In the second case we examined in this thesis, the looting and destruction in downtown Panama City resulted in \$41M in immediate emergency assistance and \$420M pledged in FY 1990-91 to help get Panama back on its feet.²²³ The postconflict costs could have been smaller if we had quickly placed forces into Panama City to maintain order after the invasion. NLWs and non-lethal tools that would have increased the security of our forces while still allowing them to operate with minimum force while producing minimum collateral damage could have resulted in savings for us all. However, the economic constraints deployed against the various NLWs in the QFD matrices only allow us to weight the negative effects of the use of a NLW. This situation is similar to that for the environmental constraints as well as to a lesser degree the other constraints .

6. Constraint Summary

Following on the next page in Table 5.1 we will summarize the relative weight of the constraints in a combined interval measure of impact of "low, medium, and high." This table summarizes the impact of the use of NLWs against target categories and tabulates them versus the three phases of a PCO: forced entry, sustainment (follow on stability ops), and the peacekeeping/humanitarian operations phase. When later inserted in the QFD analysis in

²²² Majors Mike Fisher, Chuck Howe, Jan Klaaren, and Sam Seager, "The End State," Concepts in Air Power for the Campaign Planner (Maxwell AFB, AL: ACSC, 1993), p. 152.

²²³ Fishel, John T., "The Fog Of Peace: Planning, and Executing the Restoration of Panama" (Carlisle Barracks, PA: Strategic Studies Institute, US AWC Paper, 1992), p. 29.

Appendix B, these measures will be converted into a ten point scale for conversion to a percentage measure that reduces the raw score for the unconstrained merit of a NLW. In the conclusion, we will review this analysis, discuss sensitivity analysis, and make some recommendations based on these arguments.

		Forced Entry	Sustainment	PK HA
L A S E R	Personnel	medium	medium	high
	Materiel	low	low	low
	Information	N/A	N/A	N/A
	Security	low	low	medium
C H E M	Personnel	high	high	low
	Materiel	low	low	medium
	Information	N/A	N/A	N/A
	Security	medium	medium	low
B I O	Personnel	high	high	high
	Materiel	high	high	high
	Information	high	high	high
	Security	medium	medium	medium

Table 5.1 - Comparison of Constraints for NLW use in Phases of PCOs

VI. CONCLUSION

A. GENERAL FINDINGS

This thesis surveys the broad subject of NLWs during a period when our increasing interest is driven by the combined effect of technological advances; societal and warfare paradigm shifts; military downsizing, risk reduction, cost effectiveness, and role refinement issues; and increased turbulence in regional relations in the wake of the forty-year bipolar Cold War standoff. Using the *National Security Strategy of Engagement and Enlargement* as a guide, we primarily referenced the Joint Publications supporting doctrine for special operations and MOOTW (3-05, 3-07), and then took a paradigmatic approach to develop principles and tenets to understand the problem of deciding how and when to use NLWs in "special wars" in this environment. We reviewed the definitions and theoretical framework that seemed most appropriate for both the broad study of NLWs and for determining the basis of our case study selection of "special wars" to illustrate the effects of operationalizing a new paradigm.

The current nascent state of DoD policy development for NLWs, coupled with an environment that is forcing the piecemeal fielding of systems without developed policies, testing, or training (as in the Somalia pepper gas anecdote in Chapter V.), demands basic exploration efforts. This type of preliminary research does this by venturing into incompletely defined areas and using qualitative tools linking concepts or strategies to tasks using tenets or principles garnered from the debate on control warfare. The different perceptual lens this provides offers a critical re-evaluation of how we wage war. This integrated policy approach to the employment of NLWs employs both the concepts of information dominance and the other tenets associated with control warfare to offer a different perspective on the niche that NLWs can fill at the tactical, operational, and strategic levels in conflict. The two part analysis method that was used, also helps to bridge the policy to quantitative measurement "gap" that exists when trying to measure the effectiveness of these "softer" non-lethal measures in support of national objectives and the overall scheme of events.

The arguments raised in support of the hypothesis that the more the tenets of control warfare are applied to a mission or operation, the more effective will be any application of NLWs, and the greater the likelihood of success, seems well supported by the comparative analysis of the two different follow-on Operation JUST CAUSE mini-case studies. Specifically, the respective mission areas of Military Diplomacy in Western Panama and the Urban Policing operations nicely contrast the situational possibility for NLW use when tenets of control warfare are respectively followed or ignored. The internalization of previously considered "external" constraints into the decision problem seems essential when using a broadened morale and physical model of the enemy, like the molecular model developed in this thesis. This supports a systems analysis of our linked relationship to the enemy that exists in these minimum force and minimum casualty operations. In these PCOs, where we must quickly transition from an "us versus them" forced opening to an "us helping them" end state, we ignore this linked and more complex military and political environment at our own peril. Even though the employment of NLWs in this type environment entails both the additional training, fielding, and support problems inherent in the fielding of alternate lethal methods, and the added burden of developing decision tools regarding the appropriateness of the level of response or use of NLWs given the existing ROE in a military or "policing" engagement, these general findings point to the more specific findings of this research that demands a requisite variety of options, from extreme lethality to diplomacy, to respond appropriately in these highly constrained operations. After they are detailed, we will make some general and specific recommendations for further research and offer perspectives on this subject.

B. SPECIFIC FINDINGS

The debate over NLWs has produced some consensus as to the possible advantages for their use that were listed in Chapter II under the subsection discussing advantages of nonlethal weapons. To review, by mapping out the case studies in our paradigmatic analysis it was confirmed that in the PCO and MOOTW environment that we are primarily concerned with in this thesis, NLWs could represent an intermediate strategic means to coerce

cooperation or compel the end of aberrant behavior. By looking at how we used lethal weapons in a non-lethal threatening role in the Military Diplomacy in the West case study, we saw how non-lethal measures could possibly offer several other advantages over lethal force. They may be more legally and morally defensible. They may offer less political risk with more benefits. Operationally, they may offer more appropriate military effectiveness, flexibility, and better protection and security for our troops. In tactical situations, they may be force multipliers when used in conjunction with traditional means. And finally, with the rapid development of new technologies, they may be technically feasible, supportable, and affordable.

However, before going on to a discussion of external constraints, we would be remiss to not relate arguments supporting positions that do not agree that all these advantages are necessarily good. As Eliot Cohen emphasizes, there is a clearly a danger in overselling these capabilities.²²⁴ At the strategic policy level, some are worried that the availability of "easy to use" non-lethal options may present an "attractive nuisance" and lower the threshold for war, encourage adventurism, and spread out our limited resources in marginal areas of interest.²²⁵ Others cite the blunting effect they may have on the threat of lethal deterrence. Quoting Clausewitz, in his writing on the psychology of defeat, when he spoke of the need to "kill the enemy's courage," they worry that reliance on non-lethal means could actually prolong conflict and increase U.S. casualties.²²⁶ Regardless of the diminishing effect these contrapuntal arguments may have on the military and political utility of NLWs, their immediate impact pales in comparison to the questions raised by some of the external constraints discussed on their use. As such there was no overt attempt to model the above

²²⁴ Eliot Cohen, "The Mystique of US Air Power," *Foreign Affairs*, Jan/Feb 1994, 121. Cohen feels that the most dangerous legacy of NLW technologies in the Gulf War was the "fantasy of near-bloodless use of force."

²²⁵ Sam Gardiner, "The Nonlethal Revolution in Warfare: Maybe Not such a Revolution," (RAND: unpublished monograph, 1993), p. 2.

²²⁶ Col John L. Barry, USAF; LTC Micheal W. Everett, USA; and Lt Col Allen G. Peck, USAF, (Draft - 13 May 1994), p. 24.

alternate prescriptive arguments in this healthy debate. But, they were mentally used in the QFD matrix analysis to temper judgements of possible application of NLWs to the case studies. Without the discovery of the "ultimate" NLW, temperance is offered against any arguments suggesting excess enthusiasm for NLWs as a panacea.

Specifically, for laser weapons, anti-personnel usage brought up some contentious points. The U.S. point of view on the issue is clearly based on a battlefield orientation. As such, the memorandum of law offering the decision that personnel may be targeted for blinding seems to lose its argument for support if the other means of lawful use of lasers and the other lethal weapon systems are not engaged in battle. Therefore, it is the opinion of this study that the usage in the first two phases of a PCO where open combat is ongoing may be tolerated (with medium impact), while in the third phase where it is not, presents serious legal and ethical questions (high impact). The use against matériel seems to generate low impact on the legal and ethical discussions, if personnel are not blinded in an indiscriminate manner ancillary to this usage. The full ethical impact of the development of systems like the AN/PLQ-5 Laser Countermeasure may not be able to be judged until after 10,000 enemy combatants end up as blinded veterans of a conflict. To get the legal and ethical impact reduced to a low level in all phases suggests concentration on a dedicated approach to limiting the effect on personnel to a temporary dazzlement with no long term adverse effects. Indeed, if permanent disablement of personnel occurs as a corollary result of anti-matériel laser weapons usage that indirectly affects personnel, it is doubtful that such use would fit within the definition for NLWs offered at the beginning of the thesis. It is understood that controlling dosages and the susceptibility to a dosage is an arcane art, but it should not be neglected if these weapons are developed for reasons of military necessity.

For chemical NLWs, the U.S. opinion which separates peacekeeping and humanitarian assistance operations from warfare, allows the use for crowd control and self protection in the last phase of a PCO. The wider development of calmatives and other more subtle wide-area-effects chemical NLWs may dictate a re-evaluation of legal and ethical impact. Because of the opinion that usage of new chemical NLWs that are designed to target

matériel without toxic effects on personnel does not violate the CWC, use against matériel in open conflict is judged to offer a low legal and ethical impact. However, during the "softer" HA phase of the PCO, ethical judgements based on longer term economic impacts and perceptions of exceeding necessary proportional force, may drive international opinion to go against such use. That is why the impact factor is raised to a medium level in Table 5.1. Because the U.S. currently maintains the right to respond in kind to enemy usage of chemical weapons, the legal and ethical impact in the first two phases of a PCO for non-lethal chemical usage is reduced to a medium level for self-protection security reasons.

The Department of Defense and the Department of Justice should continue cooperative efforts to develop better non-lethal chemical weapons as the constraints on lethal force that both the police and the military operate under are tightened. The dilemma that is raised by a BWC "like" new protocol on the complete prohibition of chemical non-lethal means that conflicts with the increasing constraints that call for more extensive use of these type weapons. Solving this dilemma was beyond the scope of this thesis.

For biological NLWs, the 1972 ratification of the BWC places extremely high constraints on the consideration for the usage of non-lethal biologicals. This constraint is effective across the spectrum of combat. However, two considerations combine to lower the level to a medium impact for purely self-defensive and security reasons. The first consideration deals with the proven inclination of foes to engage in environmental and ecological warfare, the latest example being Saddam Hussein's oil spill warfare in the Gulf War. The ability to militarize some bioengineers so that they could quickly be used as countermeasures to deter this type of "poison pill" blackmail needs to be explored. Also, the chances of a less ethical foe to use biological methods (both lethal and non-lethal) suggests the need for the continued investigation of "anti-biological" biologicals. Clearly, the vaccines available in the Gulf War were very crude and some were untested on such a wide group beforehand to offer much real chance of countering potential biological weapons that Iraq might have used.

All these weapons, seemingly designed to reduce the bloodshed and suffering in conflict while making involvement "safer" for intervening forces, still must meet the tests and judgmental constraints that have been established by the international community as international law and the law of war for existing classes of weapons and the use of lethal force, respectively. In this context, it has been pointed out that the argument that NLWs should be considered more humane than other weapons, the primary purpose of which is to kill, may be too simplistic. For example, international human rights agreements and national constitutions may often prohibit inhumane forms of punishment or torture while at the same time allow capital punishment. This makes it apparent that death itself is not always considered to be the worst form of injury or suffering.²²⁷ Consideration of these factors and "a fate worse than death"²²⁸ should be a prime concern for policy makers in future attempts to control the use or deployment of non-lethal technologies in general.

Additionally, even if a particular weapon is termed as legal and the use of it in a particular setting is judged legal, the ethical dimension of its use in the current "information age" will be judged by the international court of "world opinion." This additional consideration needs to be addressed before the U.S. fields these new weapons in an environment where the international press, with almost instantaneous speed, will report on the circumstances of use and results in the mass media. Finally, as "all politics are local,"²²⁹ we needed to consider the regional and local cultural and sociopolitical factors governing the

²²⁷ See in particular L. Doswald-Beck (ed.), *Blinding Weapons: Reports of the Meetings of Experts Convened by the International Committee of the Red Cross on Battlefield Laser Weapons 1989-91* (International Committee of the Red Cross: Geneva, 1993) and Kokoski, (1994), p. 383.

²²⁸ An extreme example of this type of NLW is described in a novel by Ralph Peters, *The War in 2020* (New York: Simon & Shuster Inc., 1991), pp. 430-433. He describes an insidious "scrambler" electromagnetic radio-frequency weapons system that wounds instead of kills. The weapon simply destroys the victim's control over voluntary muscles - while the victim remains a fully intelligent human being, even though he is physically and utterly incapable of controlling his basic bodily functions. The force attacked by such weapons could not "lighten their load" by euthanizing thinking, feeling human beings who have lost the use of their body in service to their country.

²²⁹ Remark attributed to Speaker of the House, Rep. "Tip" O'Neill in his retirement speech before the house.

use of certain types of NLWs,²³⁰ as we move from an environment of "us against them" to involvements better characterized as "us helping them." In cases of involvement in peacekeeping and humanitarian assistance operations that may be part of a wider PCO, the perceptions of the "locals" in regard to certain types of NLWs may cause us to consider the situational substitution of other means. This may suggest the necessity for a large palette of options and the wider development of ever better non-lethal means as we undertake the task of determining the "ideal" NLW for a specific situation.

The beauty of the QFD matrices analysis technique is that it allowed the parallelized comparison of a palette of NLWs against MOEs that correspond to specific operational tasks. Further work, by utilizing cross-functional groups of experts to define the matrices and smart decision assistance software, may provide operational commanders with the tools to take best advantage of these NLWs. As a one man project, this preliminary effort pales as a preliminary introduction to the proper deployment of QFD techniques in finding solutions to operational decision problems.

C. GENERAL RECOMMENDATIONS

What lessons can be learned from this example for application when deterrence fails in the post-Cold War world? As transnational actors and sub-national actors join the nation-state actors in this new environment, it becomes harder to use the same levers of power in extended immediate or extended general deterrence to deter action by these ethnic, nationalist or religious actors. Clearly the "rogue" nation-states that exist also can see an opportunity for action - using international terrorism, proliferation, and proxies to exact their aims.

²³⁰ For example, reference the earlier Somalia anecdote relaying that it was culturally acceptable for U.S. servicemen to wield batons against youths trying to steal from them, as the Somali elders similarly used long sticks to control unruly youths (note 216, Chapter V, interview with Lt Michael McGuire (USN SEAL). On the other hand, the other examples of the inappropriate use of NLWs (bayonets in Okinawa strike in 1969, and the use of fixed bayonets by Guardsmen against rioting U.S. college students in the late 1960s and early 1970s).

To react militarily the U.S. will be constrained by calls for incremental and multilateral actions and the use of military force as a last resort. This prevailing paradigm may insure that by the time the military options are taken the ultimate failure may be unavoidable. Additionally, large lethal force actions will not be economically or politically feasible with domestic policy issues crowding them out of the policy agenda. NLWs may provide the intermediate means by which limited intervention could be achieved early in an effective crisis management contingency response.

As a result, this analysis may also suggest a way to react effectively when deterrence has just been observed to fail. The early compellence role for these special operations forces or general purpose forces equipped with NLWs, supplemented by conventional resources, and aided by information tools that allow a fine-grained understanding of the enemy may allow the problem to be "nipped in the bud." In the same way these resources provided a framing event in theater in Panama, consistent and successful use of control warfare based forces may lead to better extended general deterrence by serving as a framing example to other potential challengers. Also, by using a control warfare perspective ahead of the intervention, the knowledge tools that model the resources needed to reach the desired morale and physical end state in a PCO may predict that the costs outweigh the benefits. For the recent Somalia intervention, the question of how much effort it would actually take to subdue and compel the warring factions to desist and to restore democratic order may have resulted in an answer - more than we are willing to spend in blood and treasure.

D. SPECIFIC RECOMMENDATIONS

These recommendations reflect specific research suggestions that follow up issues uncovered in this work but were beyond the scope of this thesis. The first specific recommendation is that the DoD Non-Lethal Steering Group provide direction for research on other recent PCO cases using similar MOEs to fully develop a database of criteria for possible policy development and procurement of NLWs as part of an integrated approach to all the measure and tools that come together when we think of RMA or paradigm shift to control warfare. Using a cross-functional groups of experts to develop nested an iterative

QFD matrices including the "house of quality" cross correlation triangle that determines how the different MOEs and operational tasks deploy into their counter parts and examining all the existing and emerging operational tasks would define the open ended universe of knowledge for viewing NLWs with respect to these known tasks.

The second recommendation is that interdisciplinary work be undertaken to merge the qualitative findings of policy-based QFD analysis with Operations Analysis quantitative multi-attribute decision problem algorithms that describe the detailed characteristics of the specific types of NLWs that fit within the functional categories that presently exist or that are projected to exist by 2020. The third recommendation addresses the increased emphasis on the counter-proliferation mission with the establishment of the Counter-proliferation Initiative. work dedicated exclusively to exploring the uses for non-lethal weapons within the "very special war" scenarios possible under this heading seems like a mandatory requirement. The fourth recommendation concerns the issue of countermeasures for NLWs. With one of the most highly technologically dependent societies in the world, the U.S. presents a lucrative target for "poorer" forces desperate to gain any advantage possible by the use of "nice" or "nasty" NLWs. Just as we view the proliferation of weapons of mass destruction as the poor man's nuke, the discussion of how or what would be targeted by an opponent deserves study, as well as the arms control implications for trying to suspend the deployment of some of the nastier NLWs possible. A fifth recommendation concerns a merged or synergistic study of how PSYOPS, Electronic Warfare, Information Warfare, Command and Control Warfare, extremely precise lethality operations, sensor developments like Hovering UAV Battlestations, small RPV's, and Tier II+ and Tier III long dwell UAVs augmenting national intelligence collection capabilities and non-lethality all fit together as part of a new paradigm for military and political operations as part of the emerging study of the RMA. Granted, this last recommendation may push the envelope on what is possible to accomplish, but the first four seem like tasks that are within the realm of current possibilities.

Finally, we must seriously consider the possibility for "backward compatibility" when forces operating within a control warfare paradigm meet second wave maneuver warfare

oriented forces or first wave attrition warfare oriented force on the expanded field of battle. The non-lethal weapons that the control warfare forces bring to battle must effectively address the type of foe faced. The singular advantage of being the first to engage in robust and redundantly supported control warfare may create similar advantages as those realized by the German's Blitzkrieg development in World War II. Before the allies caught up with this operational maneuver warfare innovation and re-leveled the playing field in the constantly raised battle of brinkmanship that still defines warfare as we move into the twenty-first century, the German's held the figurative and literal high ground. Because there is no chance for "forward compatibility" for forces that cannot operate with respect to a new paradigm that they have yet to internalize, the force that can operate within this new paradigm and understands 'backward compatibility' is going to innovate, adapt, and decisively defeat the literally and figuratively outgunned foe. I recommend that we be first to get all the elements correctly coordinated and orchestrated. Woe be unto the opponent who meets this force. Leading, fighting, managing resources, and operating effectively with robust and redundant interconnections in a chaotic environment will define the control warfare based force. The necessity for a force that deals effectively with complexity and consists of high quality well trained troops that can network their operations effectively over a dispersed battlefield/space and coordinate and orchestrate their forces to work in concert with other government agencies, coalition partners, and non-government organizations while employing a requisite variety of weapons and tool options, including non-lethal weapons as an integral part of this mix, defines the vision of a twenty-first century U.S. force that will prevail in the "special wars" yet to come.

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APPENDIX A - NLW TYPES

This appendix lists the major types and technologies of NLWs that are discussed in the thesis. It is not intended to be all inclusive, but it should represent the majority of possible weapons systems that are currently being discussed in the referenced literature on NLWs. The format used for our classification here relies primarily on the work done by Major Joseph W. Cook, III (et al) in a study done at the USAFA for HQ USAF/XOXI, *Non-Lethal Weapons and Special Operations: Technologies, Legalities, and Potential Policies*. This format was used because it dovetails with the way the legal and academic communities already view lethal chemical and biological weapons for arms control discussions.

It was easy to include electromagnetic weapons as another major type together with the these two. Lasers have garnered so much attention in recent discussions that we break out this category of electromagnetic weapons for its own separate treatment. However, some of the technologies or types of NLWs don't fit so neatly into one major category. They define their own niche and will be discussed separately.

A. BIOLOGICAL WEAPONS AS NLWS

Biological agents are living organisms (bacteria, viruses, fungi, protozoa, and rickettsiae) or the toxins derived from such organisms. These organisms or toxins can be targeted against animals, plants, or matériel. Recombinant DNA technology allows the development of designer biological weapons that attack almost anything desired. The ability to target a particular ethnic group is even a possibility.

The use of deadly biological agents such as anthrax against humans is probably the most universally accepted prohibition in modern warfare (Ref. 1972 BWC). NLW variants of biological agents designed to make humans sick or reduce their ability to function have certainly been developed, but none could truly be classified as non-lethal. Routine vaccinations, as well as normally non-lethal diseases such as influenza can sometimes result in death. The idea of dosage or control for non-lethal biologicals for use against personnel, thus remains a nebulous subject. One proposed candidate for a Bio - NLW would be a

clandestine agent that resulted in such a mild effect that the target population would be unaware of their reduced ability. Another proposal is a biological allergen that could be used for area denial.

Biological agents for use against crops and plants would be very difficult to control. One possible anecdotal example, that some speculate about, was the use of some kind of fungus for infestation of the coca plants in the Upper Huallaga Valley in Peru. However, it appears that this problem was caused by the over-intensive farming methods and not any specialized agent.

Biological agents for use against matériel are the predominant types currently under discussion. The burgeoning and well-accepted field of bioremediation relies on non-lethal bio-agents to clean up oil spills and digest toxic materials at hazardous waste sites. The development of "bugs" that will eat almost anything appears to be possible. The introduction of existing bioremediation agents in fuel or POL supplies could devastate an army's mobility. If our strategic oil reserve became contaminated, the economic and strategic costs could be enormous. Similarly, the introduction of a bug that eats silicon (the semiconductor substrate for all micro-electronics) could shut down critical computer, communications, and military guidance systems. The primary limitation to such weapons appears to be their unpredictable widespread effects and control rather than the capability to develop them.

B. CHEMICAL NLWS

As with biological weapons, chemical weapons can target animals, plants, and matériel. Non-lethal chemical agents that can target personnel come in numerous forms. The following categories list them.

- Tear/Riot Gasses. Deaths have occurred from the use of these gasses. However, exceedingly liability-conscientious domestic law enforcement organizations continue to use them because their lethality (when used appropriately and with proper training) is very consistently low. The literature on their effectiveness is extensive and maintained by the

National Institute of Justice for the U.S. Department of Justice. The older CN type has been replaced by CS for area use. FOR point usage capisorum or "pepper sprays" is replacing the liquid form of CS, Mace. Some more exotic and rarely used riot gasses include HC (smoke screens) and some extremely malodorous substances.

- Calmative Agents. These agents, sometimes called sleep agents, can be mixed with Dimethyl sulfoxide (DMSO) to allow them to be readily adsorbed through the skin and into the blood stream. Chemical agents could also be delivered by projecting onto or into the skin in solid or liquid form. Although tranquilizer guns seem like a poor idea because of the risk involved in their use, they are one means of incapacitating a subject.

- Sticky Foam. Polymer agents that can be dispensed in a stream and will hopelessly stick a person to anything.

- Super lubricants. Sometimes called liquid banana peel, they reduce traction to almost zero.

- Markers. Designed for law enforcement, these chemicals can covertly or overtly mark criminals for a long period of time. They are just about impossible to wash off.

Non-lethal chemicals that can attack plants include defoliants and crop specific destroyers.

Non-lethal chemicals that attack matériel are promising and diverse. They include the following categories.

- Combustion Alteration Technology (CAT). CAT agents change the viscosity or combustion characteristics of fuel to degrade engine performance. Engine failure is possible if the agent can be applied in sufficient quantities.

- Smart Metals. Alloys designed to fail or give off tell tail signs if used for "bad" purposes. Also, chemical tags could be ingrained into the metal to trace origin. These uses have been suggested for non/counter-proliferation tasks and for weapons tracing, respectively.
- Supercaustics. Inorganic acids that target non-organic materials and cause them to fail. They may be stored in harmless binary forms. Problems may include inadvertent contact with humans.
- Liquid Metal Embrittlement. Agents that severely weaken metal by chemically changing their molecular structure. They are clear, and leave an almost imperceptible residue.
- Anti-traction Technology. These superlubricants are specially blended to attach specific targets like roads, rails, or runways.
- Polymer Agents. Similar to sticky foam, but formulated to target matériel not personnel. Can deny the use of facilities or weapons.

C. LASER NLWS

Really a sub-class of electromagnetic weapons, they are discussed here separately because of the legal controversy over their use. Low energy lasers can be used to dazzle or blind personnel either temporarily or permanently. The most advanced blinding lasers oscillate between numerous frequencies so that countermeasures against them are virtually non-existent. High powered lasers can directly destroy matériel objects on the battlefield or create hot, high pressure plasmas in front of a target that can disable certain weapons. Laser range-finders and laser designators have been misused as low power laser weapons to blind pilots or soldiers. The Soviet-style systems, because they are so crude and need to be over-powered to work have been especially subject to this type use. The Iraqis are rumored to have blinded thousands of Iranians in the Iran/Iraq War with these systems. The Soviets

pointed systems like these on their warships at U.S. Naval Reconnaissance Aircraft in the 1980s, but deny that they did so to purposely effect vision, nevertheless we signed a protocol with each other not to do this to each other anymore.

One other development in laser technology is the isotropic radiator. These omnidirectional laser light sources are explosively driven to emit a short burst of laser light. This application seems to be best suited for self-protection, as anti-matériel measures that destroys the seeker head on a missile.

D. ELECTROMAGNETIC NLWS

This general type category includes many different types of NLWs that are directed at different target categories. The listing includes the following:

- High Power Microwaves (HPM). Utilize an explosive or generated burst of microwave energy to disable matériel. Some talk of possible targeting of personnel to cause disorientation.
- Conventional Electromagnetic Pulse (C-EMP) or Non-nuclear (NNEMP). Basically this weapon simulates the EMP effects of a small yield nuclear weapon. EMP disrupts and overloads semiconductor based (chip) electronic circuits and some smaller capacity discrete power devices. Outside of reports in *Aviation Week and Space Technology*, this subject seems designated as classified by the USG.
- Electrofied Baton, Stun Gun, TASER. These small tactical weapons are designed to control personnel at close ranges by delivering a pulsed shock that incapacitates the individual.
- High Intensity Light. Similar to low power spread Lasers, they temporarily flash blind individuals or sensors. The effect is much more pronounced at night.

- Visual Stimulus and Illusion. Basically this category includes strobe lights, large projected holograms, and high-tech camouflage. Strobos flickered at appropriate frequencies can cause nausea and incapacitation. Holograms are similar in concept to public relations displays and sky advertising as now being fielded by commercial promoters.
- ELF Fields. Extremely low frequency electric or magnetic fields can be used to interfere with brain and body functions.

E. ACOUSTIC WEAPONS

These include simple amplified high intensity sound and other loud noises and some more sophisticated developments that may offer a more effective use of acoustic energy as a NLW.

- Infrasound. This is powerful ultra low frequency sound (sub-sonic) that results in nausea and disorientation. Other variations on the theme include sonic bullets (really travelling toriodal wavefronts - donut shapes) that can pack a punch on the receiving end.
- Sonic Detectors. Really more of a non-lethal tool, these devices are developed from the rescue industry and may detect human presence behind nonmetallic barriers or rubble.

F. MECHANICAL WEAPONS

This category includes familiar batons and nightsticks of law enforcement and some more advanced recently enhanced devices.

- Bludgeoning Instruments. May include clubs, batons, night sticks, and rubber hoses. The misuse of these NLWs by many groups throughout history has caused more harm than good as an effective coercive measure. In fact, in Panama, the primary task of the 7th special

forces during the post-conflict rebuilding phase, when retraining the police, was to rid the National Police of rubber hoses used in interrogations of criminals, prisoners, or suspects.

- Projectiles. These also have a long history and can be easily misused if the proper training is not provided in the use of specific devices. The listing includes shot bags, plastic or rubber bullets, foam rubber ball grenades and any other device that is fired explosively at personnel.

- Barriers. The newest versions include explosively fired sticky/stinging nets and other ensnaring devices. Rapidly expanding foams and airbag restraints also fit this category.

G. INFORMATIONAL WEAPONS

This type include PSYOPs and other novel high tech possibilities.

- Voice Synthesis. The ability to clone a person's voice and broadcast it.

- Morphing. Visual images may be altered so that recorded actions may be easily fabricated to depict an individual speech or order that never actually existed.

- Psychotropic Weapons. Reported by the Russian press, this technique involves injecting subliminal messages into the minds of a target audience.

APPENDIX B - NLW EFFECTS

This Appendix, from the U.S. Army Research Development and Evaluation Center (ARDEC) at Picatinny Arsenal in New Jersey, is included as the best unclassified source to accompany Appendix A when judging the applicability of NLWs for the QFD matrices analysis. All the categories listed were included in our evaluation except for the Time To Effect category. The rationale for this is mentioned in the analysis in Chapter V.

NON-LETHAL TECHNOLOGIES						
TECHNOLOGY	MATURITY	RANGE (meters)	DISTANCE FOR ACTIVATION (meters)	TIME TO EFFECT	DURATION OF EFFECT	COMMENT
OPTICAL/FLASH	NOW	100-2000	Instant	Instant	Instant + TBD	Battlefield Optical Munition - LANL/ARDEC; LOMS - NVL; Slingray - CECOM; Dazer - USMC
	NEAR	50-500	Same	Same	Same	
	FAR	+2000	Same	Same	Same	
KINETICS	NOW	20-100	3-10	Instant	Instant-15min	Sponge-ARL/ARDEC; Rubber Multi-Shot - NSWC
	NEAR	10-200	TBD	Same	TBD	
	FAR	TBD	TBD	TBD	TBD	
ACOUSTICS	NOW	?	?	?	?	SARA Demo - ARDEC; Propagational Effects - ARL
	NEAR	TBD	Instant	Instant	Seconds-Days	
	FAR	TBD	Instant	Instant	Same	
CHEMICALS (Antipersonnel) Irritants/Calmatives	NOW	Platform Dep.	Instant	Instant	<15 min ?	Irritants, CS, CR Available; Need to Determine Delivery Methods; Calmatives - ERDEC
	NEAR	Platform Dep.	Instant	Instant	?	
	FAR	Platform Dep.	Instant	Instant	?	
PYROTECHNIC STUN	NOW	Platform Dep.	Instant	Instant	5 sec - TBD	XM84 Stun Grenade - NSWC/ARDEC
	NEAR	Platform Dep.	Instant	Instant	TBD	
	FAR	Platform Dep.	Instant	Instant	TBD	
ELECTRIC STUN	NOW	0-5	>1	Instant	1min-1hr	
	NEAR	3-TBD	>1	Instant	1min-TBD	
	FAR	TBD	TBD	TBD	TBD	
ENTANGLEMENTS/ ENVELOPMENTS/ AIR BAGS	NOW	0-TBD	Instant	Instant	Until removed	Net - SBIR - ARDEC
	NEAR	TBD	Instant	Instant	TBD	
	FAR	TBD	TBD	TBD	TBD	

NOW - Immediately available for Warfighting Experimentation and Evaluation.
NEAR - Available within 1-2 years for Warfighting Experimentation and Evaluation
FAR - Available 3 or more years for Warfighting Experimentation and Evaluation

From ARDEC

NON-LETHAL TECHNOLOGIES (continued)

TECHNOLOGY	MATURITY	RANGE (meters)	DISTANCE FOR ACTIVATION (meters)	TIME TO EFFECT	DURATION OF EFFECT	COMMENT
CHEMICAL (OTHERS)	NOW	0 - 100	Instant	Seconds	Minutes - Hours	Catalonics - ERDEC
	NEAR	0 - 2000	Instant	Seconds	Minutes - Hours	Combustion Inhibitors - ERDEC;
	FAR	Platform Dep.	Instant	Seconds	Minutes - Hours	Slicky Foams - DOE
RADIO FREQUENCY/ EMP	NOW	Platform Dep.	CLASSIFIED	CLASSIFIED	CLASSIFIED	ARL/DOE
	NEAR	Platform Dep.	CLASSIFIED	CLASSIFIED	CLASSIFIED	
	FAR	Platform Dep.	?	?	?	
PSYCHOTECHNOLOGY	NOW	?	?	?	?	
	NEAR	?	?	?	?	
	FAR	?	?	?	?	

NOW - Immediately available for Warfighting Experimentation and Evaluation.

NEAR - Available within 1-2 years for Warfighting Experimentation and Evaluation

FAR - Available 3 or more years for Warfighting Experimentation and Evaluation

From ARDEC

APPENDIX C - QFD ANALYSIS

This appendix contains the output of the QFD/Capture software program used to evaluate NLWs. The data of interest for our evaluation is the sum total of the net assessments of NLWs for each of the four categories of NLWs for each case study. This single number is compared between the two case studies to determine how well NLWs would apply to the operational tasks within each case. This is done within the context of the situation faced by the U.S. forces as they approached each mission. For example, in a sensitivity analysis of the Urban case, if one was to assume that these NLWs did not just apply to the de facto situation after the invasion, but were brought in beforehand as part of a decision to maintain information dominance and presence, one would have to assume that the sum total of the net assessments would increase. This type of evaluation would be best left to more detailed cross-functional team studies, as it is too easy for this to only represent a self-fulfilled prophecy for this one-man effort.

Case Study 1 - Campaign in the West

Correlation Matrix Legend

Strong	⊙	9
Moderate	○	3
Weak	△	1

	Multiplier	PERSONNEL	Biological Weapons	Chemical Weapons	Tear/Riot Gases	Calmatives	Sticky Foams	Slick Agents	Electromagnetic Weapons	Electrofied baton, Stun belt/guns	Lasers (dazzlers)	Visual Stimulus/Ilusion	Acoustic Weapons/Infrasound	Mechanical/Entanglements	Projectiles/Bludgeoning Instrument
SHOOT															
Friendly casualties - near zero/enemy cas minimized					△	△	○	○		△	○	△	○	△	△
Enemy deterred from engaging			⊙		△	△	○	△		○	⊙	○	○	△	△
Enemy fire detected and traced															
Friendly NL fires - precise w/min non-combatants involve							○	△		○	⊙	△	△	○	△
MOVE															
Most vehicles disabled (>95%)								△						△	
Enemy soldiers frozen in place (>90%)			○		○	△	○	○		△	○	△	△	○	△
COMMUNICATE															
Enemy communication disrupted (>95%)					△	△							△		
KNOW															
Enemy information systems non-functional						△						△	△		
REACT															
Reaction delayed within 95% of target time						○	○	○		△	○	○	○	△	△
Total Scores			12		6	8	15	12		9	27	10	13	10	5
Constraints															
Legal & Ethical	0.40		10		8	8	4	4		3	7	3	2	2	6
Informational	0.20		5		3	5	2	2		4	7	3	2	1	5
Environmental	0.20		10		5	3	1	2					3		
Economic	0.20		5		1	1	2	2		1	4	3	1	1	2
Combined Constraint Effect - Percent impact on raw total			0.80		0.50	0.50	0.26	0.28		0.22	0.50	0.24	0.20	0.12	0.38
Net Assessment			2.4		3.0	4.0	11.1	8.6		7.0	13.5	7.6	10.4	8.8	3.1

Case Study 1 - Campaign in the West

Correlation Matrix Legend	
Strong	⊙ 9
Moderate	○ 3
Weak	△ 1

	Multiplier	MATERIEL	Bio Anti-Mat Microbes	Chemical Weapons	Sticky Foams - polymer agents	Slick Agents - Anti-Traction	Combustion inhibitors	Superreagents	Electromagnetic Weapons	Lasers - anti-sensor	Isotropic Radiators	HPM	NNEMP	Mechanical/Barrier	Counterfire IR/Radar sensors
SHOOT															
Friendly casualties - near zero/enemy cas minimized			△		○	△	△	△		○	○	⊙	⊙	△	○
Enemy deterred from engaging			○		△	△	△	△		⊙	△	⊙	○	△	○
Enemy fire detected and traced															⊙
Friendly NL fires - precise w/min non-combatants involve			△		○	△	○	△		⊙	○	○	○	○	○
MOVE															
Most vehicles disabled (>95%)			△		○	△	○	△		△		○	⊙	△	△
Enemy soldiers frozen in place (>90%)			△		△	△	△			○	△	△	△	△	△
COMMUNICATE															
Enemy communication disrupted (>95%)			△					△				○	⊙		
KNOW															
Enemy information systems non-functional			△					△				○	⊙		
REACT															
Reaction delayed within 95% of target time			△		○	△	△	△		○	△	○	○	△	○
Total Scores			10		14	6	10	7		28	9	34	46	8	23
Constraints															
Legal & Ethical	0.30		10		4	3	7	9		6	5	6	9	2	
Informational	0.20		5		2	1	2	4		6	2	5	7	1	
Environmental	0.20		10		7	4	4	8			2	8	7		
Economic	0.30		10		3	3	5	7		8	5	8	9	1	
Combined Constraint Effect -Percent impact on raw total			0.90		0.39	0.28	0.48	0.72		0.54	0.38	0.68	0.82	0.11	
Net Assessment			1.0		8.5	4.3	5.2	2.0		12.9	5.6	10.9	8.3	7.1	23.0

Case Study 1 - Campaign in the West

Correlation Matrix Legend		
Strong	⊙	9
Moderate	○	3
Weak	△	1

	Multiplier	INFORMATIONAL	Morphing	Voice Synthesis	Computer Viruses	Sky Holograms	Psycho-correction/tropic	Biological Weapons	Bio Anti-Mat Microbes	Chemical Weapons	Superreagents	Electromagnetic Weapons	HPM	NNEMP	Acoustic - Infrasonic
SHOOT															
Friendly casualties - near zero/enemy cas minimized			△	○	△	○	△		△		△		⊙	⊙	○
Enemy deterred from engaging			△	○	△	○	○		△		○		○	○	○
Enemy fire detected and traced															
Friendly NL fires - precise w/min non-combatants involve			⊙	⊙		⊙	△		△		△		○	○	△
MOVE															
Most vehicles disabled (>95%)									△		△		○	⊙	
Enemy soldiers frozen in place (>90%)			△	○		△	△		△				△	△	△
COMMUNICATE															
Enemy communication disrupted (>95%)			○	○		△	△		○		△		○	⊙	△
KNOW															
Enemy information systems non-functional			△	△	△		△		○		△		○	⊙	△
REACT															
Reaction delayed within 95% of target time			△	○		△	△		△		△		○	○	△
Total Scores			17	25	3	18	9		12		9		28	46	11
Constraints															
Legal & Ethical	0.30		5	5	8	2	10		10		9		6	9	
Informational	0.20		6	5	7	3	8		5		4		5	7	
Environmental	0.20				3		3		10		8		8	7	
Economic	0.30		3	3	6	3			10		7		8	9	
Combined Constraint Effect -Percent impact on raw total			0.36	0.34	0.62	0.21	0.52		0.90		0.72		0.68	0.82	
Net Assessment			10.9	16.5	1.1	14.2	4.3		1.2		2.5		9.0	8.3	11.0

Case Study 1 - Campaign in the West

Correlation Matrix Legend	
Strong	⊙ 9
Moderate	○ 3
Weak	△ 1

	Multiplier	SECURITY	Biological Weapons	Chemical Weapons	Tear/Riot Gases	Sticky Foams	Electromagnetic Weapons	Isotropic Radiator	Electrofied baton, Stun belt/guns	Lasers (dazzle/anti-sensor)	Visual Stimulus/Illusion	Acoustic Weapons/Infrasound	Mechanical/Entanglements	Projectiles/Bludgeoning Instrument	Microwave - Low/High-POWER	NNEMP
SHOOT																
Friendly casualties - near zero/enemy cas minimized			○		△	○		⊙	△	○	○	○	△	△	○	○
Enemy deterred from engaging			○		△	○		○	○	⊙	○	○	△	△	○	○
Enemy fire detected and traced																
Friendly NL fires - precise w/min non-combatants involve			△		△	○		○	○	⊙	△	△	○	△	△	△
MOVE																
Most vehicles disabled (>95%)			△			△							△		○	○
Enemy soldiers frozen in place (>90%)			△		△	△		○	△	○	△	○	○	△	△	△
COMMUNICATE																
Enemy communication disrupted (>95%)			△		△			△				△			△	⊙
KNOW																
Enemy information systems non-functional			△								△	△			△	
REACT																
Reaction delayed within 95% of target time			△		△	○		△	△	○	○	○	△	△	△	○
Total Scores			12		6	14		20	9	27	12	15	10	5	14	23
Constraints																
Legal & Ethical	0.40		10		8	4		5	3	7	3	2	2	6	7	5
Informational	0.20		5		3	2		5	4	7	3	2	1	5	7	5
Environmental	0.20		10		5	1		1				3			5	4
Economic	0.20		5		1	2			1	4	3	1	1	2	3	7
Combined Constraint Effect - Percent impact on raw total			0.80		0.50	0.26		0.32	0.22	0.50	0.24	0.20	0.12	0.38	0.58	0.52
Net Assessment			2.4		3.0	10.4		13.6	7.0	13.5	9.1	12.0	8.8	3.1	5.9	11.0

Case Study 2 - Follow-on Urban Campaign

Correlation Matrix Legend		
Strong	⊙	9
Moderate	○	3
Weak	△	1

	Multiplier	PERSONNEL	Biological Weapons	Chemical Weapons	Tear/Riot Gases	Calmatives	Sticky Foams	Slick Agents	Electromagnetic Weapons	Electrofied baton, Stun belt/guns	Lasers (dazzlers)	Visual Stimulus/Illusion	Acoustic Weapons/Infrasound	Mechanical/Entanglements	Projectiles/Bludgeoning Instrument
SHOOT															
Friendly casualties - near zero/enemy cas minimized					○		○	○		⊙	○	○	○	○	△
Enemy deterred from engaging			○		△	△	△	△		△	⊙	○	⊙	△	△
Enemy fire detected and traced															
Friendly NL fires - precise w/min non-combatants involve							△			△	△			△	△
MOVE															
Most vehicles disabled (>95%)					△		△	△						△	
Enemy soldiers frozen in place (>90%)			△		△	△	△	○		△	△	△	△	△	△
COMMUNICATE															
Enemy communication disrupted (>95%)					△	△							△		
KNOW															
Enemy information systems non-functional						△						○	△		
REACT															
Reaction delayed within 95% of target time						△	△	○		△	△	○	△	△	△
Total Scores			4		7	5	8	11		13	15	13	16	8	5
Constraints															
Legal & Ethical	0.40		10		8	8	4	4		3	7	3	4	2	6
Informational	0.20		7		5	5	2	2		6	7	5	2	3	7
Environmental	0.20		10		5	3	3	4					3		
Economic	0.20		5		3	1	2	2		1	5	3	3	4	2
Combined Constraint Effect - Percent impact on raw total			0.84		0.58	0.50	0.30	0.32		0.26	0.52	0.28	0.32	0.22	0.42
Net Assessment			0.6		2.9	2.5	5.6	7.5		9.6	7.2	9.4	10.9	6.2	2.9

Case Study 2 - Follow-on Urban Campaign

Correlation Matrix Legend																	
Strong	⊙	9															
Moderate	○	3															
Weak	△	1															
	Multiplier	MATERIEL	Bio Anti-Mat Microbes	Chemical Weapons	Sticky Foams - polymer agents	Slick Agents - Anti-Traction	Combustion inhibitors	Superreagents	Electromagnetic Weapons	Lasers - anti-sensor	Isotropic Radiators	HPM	NNEMP	Mechanical/Barrier	Counterfire IR/Radar sensors		
SHOOT																	
Friendly casualties - near zero/enemy cas minimized			△		○	△	△	△		○	○	⊙	⊙	△	○		
Enemy deterred from engaging			○		△	△	△	△		⊙	△	⊙	○	△	○		
Enemy fire detected and traced															⊙		
Friendly NL fires - precise w/min non-combatants involve					△	△				○	△	△		○	⊙		
MOVE																	
Most vehicles disabled (>95%)			△		○	△	○	△		△		○	⊙	△	△		
Enemy soldiers frozen in place (>90%)					△	△				○	△	△	△	△	△		
COMMUNICATE																	
Enemy communication disrupted (>95%)			△					△				○	⊙				
KNOW																	
Enemy information systems non-functional			△					△				○	⊙				
REACT																	
Reaction delayed within 95% of target time			△		○	△	△	△		○	△	○	○	△	○		
Total Scores			8		12	6	6	6		22	7	32	43	8	29		
Constraints																	
Legal & Ethical	0.30		10		4	3	7	9		8	5	6	9	2			
Informational	0.20		5		2	1	2	4		6	2	5	7	1	2		
Environmental	0.20		10		7	4	4	8			2	8	7				
Economic	0.30		10		3	3	5	7		8	5	8	9	4			
Combined Constraint Effect -Percent impact on raw total			0.90		0.39	0.28	0.48	0.72		0.60	0.38	0.68	0.82	0.20	0.04		
Net Assessment			0.8		7.3	4.3	3.1	1.7		8.8	4.3	10.2	7.7	6.4	27.8		

Case Study 2 - Follow-on Urban Campaign

Correlation Matrix Legend		
Strong	⊙	9
Moderate	○	3
Weak	△	1

	Multiplier	INFORMATIONAL	Morphing	Voice Synthesis	Computer Viruses	Sky Holograms	Psycho-correction/tropic	Biological Weapons	Bio Anti-Mat Microbes	Chemical Weapons	Superreagents	Electromagnetic Weapons	HPM	NNEMP	Acoustic - Infrasound
SHOOT															
Friendly casualties - near zero/enemy cas minimized			△	○	△	○	△		△		△		⊙	⊙	○
Enemy deterred from engaging			△	○	△	○	○		△		○		○	○	○
Enemy fire detected and traced															
Friendly NL fires - precise w/min non-combatants involve			○	⊙	△	⊙	△		△		△		△	△	△
MOVE															
Most vehicles disabled (>95%)									△		△		○	⊙	
Enemy soldiers frozen in place (>90%)			△	○		△	△		△				△		△
COMMUNICATE															
Enemy communication disrupted (>95%)			○	○		△	△		○		△		○	⊙	△
KNOW															
Enemy information systems non-functional			△	△	△		△		△		△		○	⊙	△
REACT															
Reaction delayed within 95% of target time			△	○	△	△	△		△		△		○	○	△
Total Scores			11	25	5	18	9		10		9		26	43	11
Constraints															
Legal & Ethical	0.30		5	5	8	2	10		10		9		6	9	2
Informational	0.20		6	5	7	3	8		5		6		7	7	
Environmental	0.20				3		3		10		8		8	7	2
Economic	0.30		3	3	6	3			10		7		8	9	
Combined Constraint Effect -Percent impact on raw total			0.36	0.34	0.62	0.21	0.52		0.90		0.76		0.72	0.82	0.10
Net Assessment			7.0	16.5	1.9	14.2	4.3		1.0		2.2		7.3	7.7	9.9

Case Study 2 - Follow-on Urban Campaign

		Multiplier	Correlation Matrix Legend														
			SECURITY	Biological Weapons	Chemical Weapons	Tear/Riot Gases	Sticky Foams	Electromagnetic Weapons	Isotropic Radiator	Electrofied baton, Stun bell/guns	Lasers (dazzle/anti-sensor)	Visual Stimulus/Illusion	Acoustic Weapons/Infrasound	Mechanical/Entanglements	Projectiles/Bludgeoning Instrument	Microwave - Low/High-POWER	Counterfire IR/Radar Sensors
SHOOT																	
Friendly casualties - near zero/enemy cas minimized					○		△	○		⊙	△	○	○	△	△	○	○
Enemy deterred from engaging					○		△	○		○	○	○	○	△	△	△	○
Enemy fire detected and traced																	⊙
Friendly NL fires - precise w/min non-combatants involve					△		△	○		○	○	△	△	○	△	△	△
MOVE																	
Most vehicles disabled (>95%)					△			△						△		△	
Enemy soldiers frozen in place (>90%)					△		△	△		○	△	○	△	○	△	△	
COMMUNICATE																	
Enemy communication disrupted (>95%)					△		△			△			△			△	
KNOW																	
Enemy information systems non-functional					△							△	△			△	
REACT																	
Reaction delayed within 95% of target time					△		△	○		△	△	○	○	△	△	△	○
Total Scores					12		6	14		20	9	13	12	15	10	5	19
Constraints																	
Legal & Ethical		0.40			10		8	4		5	3	7	3	2	2	6	
Informational		0.20			5		3	2		5	4	7	3	2	1	5	2
Environmental		0.20			10		5	1		1				3			
Economic		0.20			5		1	2			1	4	3	1	1	2	
Combined Constraint Effect - Percent impact on raw total					0.80		0.50	0.26		0.32	0.22	0.50	0.24	0.20	0.12	0.38	0.04
Net Assessment					2.4		3.0	10.4		13.6	7.0	6.5	9.1	12.0	8.8	3.1	18.2

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